Volume IV
Appendices
Book 1 of 3

Final Engineering Report
Former Raritan Arsenal
Contamination Evaluation
Edison, New Jersey

Project No. C02NJ008400
Contract No. DACW41-87-D-0153

U.S. Army Corps of Engineers
Kansas City District

August 1989

O'BRIEN & GERE

RARITAN ARSENAL CONTAMINATION EVALUATION

ENGINEERING REPORT

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INVENTORY OF AVAILABLE DATA RECORDS

SUMMARY INVENTORY OF AVAILABLE RECORDS

Area	Source	Type	Description
A. General Arsenal Site			
A-1.	Federal Business Center	Map	U.S.Army regional base map showing arsenal locations in New Jersey circa (12-15-59)
A-2.	Federal Business Center	Map	Raritan Arsenal real estate map showing existing facilities circa (5-14-59) DWG # D-1105 (w/results of interview w/ J.Yaros, 2/88)
A-3.	Federal Business Center	Air Photo	Photo showing region surrounding site area circa (5-12-86) photo# 86-1386
A-4.	U.S. Army	Document	Defense Environmental Restoration Program Raritan Arsenal circa 1985
A-5.	Summitt Associates	Document	Information concerning "Contaminated Areas" at Raritan Center.
A-6.	New Jersey D.E.P.	Document	U.S.Army 1961 description of planned removals, decon, etc.
A-7.	New Jersey D.E.P.	Document	Corp of Engineers Scope of Work for contamination evaluation at the Former Raritan Arsenal.
A-8.	New Jersey D.E.P.	Document	Review of Scope of Work 12-03-86.
A-9.	New Jersey D.E.P.	Document	Review of Scope of Work 11-19-86.
A-10.	New Jersey D.E.P.	Document	Review of Scope of Work 12-01-86.
A-11.	New Jersey D.E.P.	Document	Fact sheet,G.S.A. Raritan Arsenal.
A-12.	United States E.P.A.	Document	E.P.A. comments on Draft Scope of Work.

SUMMARY INVENTORY OF AVAILABLE RECORDS

Area	Source	Type	Description
A.General Arsenal Site (cont.)			
A-13.	Summitt Associates	Document	General information on U.X.B.
A-14.	Edison D.H.H.R.	Document	Copy of deed of the sale of the former Raritan Arsenal from G.S.A.to Federal Storage Warehouses.
A-15.	New York Corps. of Engineers (12-87)	Document	Recent owners of arsenal property with tax information. Date ?
A-16.	Kansas City Corps. of Engineers	Document	Deed information on cont.areas in Raritan Center exc.1&10 (legible copy)
A-17.	Kansas City Corps. of Engineers	Document	Record of deeds for arsenal sale.
A-18.	Kansas City Corps. of Engineers	Document	Statement of clearance of contaminated areas by Letter--kenny Army Depot.
A-19.	Kansas City Corps. of Engineers	Document	U.S.Army S.O.P. for deconning buildings at the arsenal.
A-20.	Federal Business Center	Map	Water distribution system in Raritan Center showing main trunk lines circa 1980.
A-21.	Kansas City Corps. of Engineers	Document	Chronology of events leading to contamination evaluation at former Raritan Arsenal.
A-22.	Federal Business Center	Map	Gas distribution system in Raritan Center showing main trunk lines circa May,1987.
A-23.	Federal Business Center	Map	Telephone distribution system in Raritan Center showing main trunk lines circa 1980.
A-24.	Kansas City Corps. of Engineers	Map	Real estate maps used in sale of arsenal circa June,1957.
A-25.	Federal Business Center	Airphoto	Airphotos of arsenal circa 1962 or 1964.

SUMMARY INVENTORY OF AVAILABLE RECORDS

Area	Source	Type	Description
A. General Arsenal Site			
A-26.	Summit Associates/ Kansas City Corps of Engineers	Map	Raritan Arsenal General Plan D-418, revised 10/63 to show locations of contaminated areas.
A-27.	USDA Agricultural Stabilization and Conservation Service (ASCS)	Airphoto	Raritan Arsenal, 1947; Scale 1"=400'(1:4800).

SUMMARY INVENTORY OF AVAILABLE RECORDS

	Area	Source	Type	Description
B. Specific Contaminated Areas				
B-1.	4,5, 7,15 3,8.	Federal Business Centers/U.S.Army plan# 18-04-01 file # 7436-412	Map	Map showing where contaminated areas exist in relation to Army structures circa 12-15-59 shows areas 4,5,7,N.E.corner 14 and 15,southern tip area 3 part of area 8.
B-2.	6,14 11, 13.	Federal Business Center/U.S.Army plan # 18-04-01 file # 7436-413	Map	Map showing where contaminated areas exist in relation to Army structures circa 12-15-59 shows area 6, rest of area 14, northern half of 11 & 13.
B-3.	12 11 13 16	Federal Business Center/U.S.Army plan # 18-04-01 file # 7436-410	Map	Map showing where contaminated areas exist in relation to Army structures circa 12-15-59 shows areas 12,rest of area 11 & 13,southern half of area 16.
B-4.	9,8 16 10	Federal Business Center/U.S.Army plan # 18-04-01 file # 7436-409	Map	Map showing where contaminated areas exist in relation to Army structures circa 12-15-59 shows areas 9, rest of area 16, southeastern area 10,
B-5.	10 17	Federal Business Centers/U.S.Army plan # 18-04-01 file # 7436-407	Map	Map showing where contaminated areas exist in relation to Army structures circa 12-15-59 shows rest of area 10,southern part of 17.
B-6.	1	Federal Business Center/U.S.Army plan # 18-04-01 file # 7436-408	Map	Map showing where contaminated areas exist in relation to Army structures circa 12-15-59 shows area 1.
B-7.	---	Federal Business Center/U.S.Army DWG#s 563 & 564	Drawings	Detailed drawings on how to build below ground storage for bombs circa 12-11-46.

SUMMARY INVENTORY OF AVAILABLE RECORDS

	Area	Source	Type	Description
B. Specific Contaminated Areas (cont.)				
B-8.	all	Federal Business	Map	Existing Plan of Raritan Center an adjacent undeveloped areas circa 1986.
B-9.	all	Federal Business Center	Map	General master plan of areas owned by Federal Business Center circa 1986.
B-10.	all	Summitt Associates	Map	Map showing areas owned by Summitt Associates,undated.
B-11.	all	Federal Business Center	Map	Map showing lot & block #'s for the former Raritan Arsenal
B-12.	all	Federal Business Center	Air photo	Blowup of photo # 86-1386 circa 5-12-86,showing former Raritan Arsenal.(see item A-3)
B-13.	1-16	Summitt Associates	Documents	"Environmental Inventory of the Raritan Center Study Area" by Schmid & Co.(1-87), 2 Vol.
B-14.	9	Summitt Associates (from U.X.B.)	Document	"UXO Search and Clearance Plan" -decontamination procedure for area # 9 part 2.
B-15.	10	Middlesex County Engineer's Office, job # 73/36	Map	Topographic map of Thomas A. Edison County Park dated 8-12-74, scale 1"=60'(2 sheets).
B-16.	10 17	Middlesex County Engineers Office	Map	Site location bought for county park and college from General Services Administra--tion (former Raritan Arsenal) circa 7-10-63.
B-17.	9	Summitt Associates	Document	Subsurface investigation for building 470.

SUMMARY INVENTORY OF AVAILABLE RECORDS

Area	Source	Type	Description
B. Specific Contaminated Areas (cont.)			
B-18. 8	Summitt Associates	Document	Subsurface investigation of 24 acre tract for building 400.
B-19. 2	Summitt Associates	Document	Subsurface investigation for buildings 426 & 427.
B-20. 9	Summitt Associates	Document	Subsurface investigation for building 471.
B-21. 9	Summitt Associates	Document	Subsurface investigation for 100 Newfield Rd.
B-22. 8	Summitt Associates	Document	Subsurface investigation for building 300.
B-23. 2	Summitt Associates	Document	Subsurface investigation for 161 Fieldcrest Ave..
B-24. 5	Summitt Associates	Document	Subsurface investigation for proposed road.
B-25. 9	Summitt Associates	Document	Subsurface investigation for building 468.
B-26. 15	Federal Business	Document	Memo's on area 15 and subsequent cleanup by U.S. Army.
B-27. 10	Federal Business Center	Document	Subsurface investigation for building 423.
B-28. 1	New Jersey D.E.P.	Document	N.U.S. radiation survey on area 1 in G.S.A. property.
B-29. 1	New Jersey D.E.P.	Document	Final draft of N.U.S. survey of radiation in building's 205 & 214 for the E.P.A..
B-30. 1	New Jersey D.E.P.	Document	Subsequent investigation for radiation of G.S.A. and college property by the U.S. E.P.A. May 2,1986.

SUMMARY INVENTORY OF AVAILABLE RECORDS

Area	Source	Type	Description
B. Specific Contaminated Areas (cont.)			
B-31. 1	New Jersey D.E.P.	Document	Airphoto analysis of G.S.A. property for the E.P.A..
B-32. 16	Summitt Associates	Document	Army ordnance cleanup in area 16.
B-33. 16	Summitt Associates	Document	Unexploded shells around building 643,found 1985.
B-34. 9	Summitt Associates	Document	Search of contaminated area at 95 Newfield Ave. site.
B-35. 5	Federal Business Center	Document	Soil investigation near area 5.
B-36. 11	Federal Business Center	Document	Soil investigation for J.M.Huber Co..
B-37. 3	Federal Business Center	Document	Soil investigation for buildings 2 thru 5.
B-38. 4	Federal Business Center	Document	Soil investigation for 100 Clover Place.
B-39. 3	Federal Business Center	Document	Soil investigation for Campus Plaza West.
B-40. 10	Federal Business Center	Document	Soil investigation for building 410.
B-41. 10	Federal Business Center	Document	Soil investigation for building 409.
B-42. 10	Federal Business Center	Document	Soil investigation for building 422.
B-43. 3	Federal Business Center	Document	Soil investigation for Group Facilities Building.
B-44. 4&5	Federal Business Center	Document	Soil investigation for U.P.S. parking lot.
B-45. 10&9	Federal Business Center	Document	Soil investigation for Fernwood Ave..

SUMMARY INVENTORY OF AVAILABLE RECORDS

Area	Source	Type	Description
B. Specific Contaminated Areas (cont.)			
B-46. 1	New Jersey D.E.P.	Document	Memo on radiation survey 09-25-86.
B-47. 1	New Jersey D.E.P. D.H.W.M.	Document	Closure of building 246 dated 7-22-87. file # 12-0579
B-48. 11	New Jersey D.E.P. D.H.W.M.	Document	Status change request for J.M.Huber Corp. and some background information on same. dated 5-22-87. file # 12-0528
B-49. 16	New Jersey D.E.P. D.H.W.M.	Document	Note on spill that occurred on Newfield St. dated 7-28-86. file # 12-0599/check bldg.630
B-50. 6	New Jersey D.E.P. D.H.W.M.	Document	Report on brush fire at J.M. LaPlace Company 6-11-85. file # 12-0576
B-51. 15	Federal Business Center	Document	Proposed landfill site.
B-52. 15	Federal Business Center	Document	Proposed building on old landfill site.
B-53. 3,9	Summitt Associates	Document	Assessment and recommendation contamination.
B-54. 3,9 16	Summitt Associates	Document	Report and recommendations from U.X.B..
B-55. 9	Summitt Associates	Document	Startup of clearance of area 9 from U.X.B..
B-56. 16	Edison D.H.H.R. Dept.of Health and Human Resources	Document	Discussion with N.J.D.E.P. about chemical contamination from Blue Spruce Co. in buildings 651 and 652.
B-57. 16	Edison D.H.H.R. Dept.of Health and Human Resources	Document	Inventory of insecticides manufactured by Blue Spruce Co.

SUMMARY INVENTORY OF AVAILABLE RECORDS

Area	Source	Type	Description
B.Specific Contaminated Areas (cont.)			
B-58. 4	Edison Dept. of Health	Document	Possibility of mustard gas buried in area 4.
B-59. 5	Kansas City Corps. of Engineers	Document	Cover letter to F.Viscelgis of C.Blumeling half report of investigation to find D.D.S. (7-28-70) (cover letter only)
B-60. 5	Kansas City Corps. of Engineers	Document	Report of the investigation of the chemical agent burial area July 12, 1961.
B-61. 9	Kansas City Corps. of Engineers	Document	Report of subsurface investigation for building 104 Sunfield Ave..
B-62. 2	Kansas City Corps. of Engineers	Document	Report of subsurface investigation for 121 Fieldcrest Ave.
B-63. 9	Kansas City Corps. of Engineers	Document	Report of subsurface investigation for 75 Newfield Ave.
B-64. 2,3	New Jersey State Hazardous Waste Facilities Siting Commission	Document	Geohydrologic Site Characterization showing direction of ground water flow.
B-65. 1	Kansas City Corps. of Engineers	Document	Preliminary review of E.P.A./ N.U.S. radiological survey of the G.S.A. Raritan Depot (by Argonne National Labs. for the U.S. Army)
B-66. 5	Kansas City Corps. of Engineers	Document	Sanitary aspects of DDS disposal.
B-67. 16	Edison Department of Health /Malcolm Pirnie, Inc.	Document	Site reconnaissance report and results of soil sample analyses at Blue Spruce Co., which leased Buildings 651 and 652; May 1985.
B-68. 9	Edison, N.J. Department of Health	Document	Weekly activity logs of cleanup of P.C.B. contaminated oils in Building 455.

APPENDIX B

ORDNANCE SEARCH AND REMOVAL REPORTS - UXB INTERNATIONAL, INC./U.S. ARMY 54TH EOD, FORT MONMOUTH, NJ

UXB INTERNATIONAL, INC.
4163 CHAIN BRIDGE ROAD • FAIRFAX, VIRGINIA 22030
TELEPHONE 703/385-6622
FAX 703/385-9640

April 12, 1988

O'Brien & Gere
Raritan Plaza I
Edison, N.J. 08837
Attn: Mr. Joe Valdes, P.A.
Ref: File No. 3068.005 #2

Re: Former Raritan Arsenal Contamination Evaluation,
Contaminated Area No. 4

Dear Mr. Valdes:

Please find our field report for the consulting services in support of the surveyor Sailer & Sailer. UXB International, Inc. must formally state that it regards the site as highly hazardous and that immediate action is required to deny access to the site by the public and other unauthorized persons. The minimum required is a fence with notices posted and the relevant authorities notified of the status of the area.

Details of the surface contamination is discussed in the field notes with a sketch of the area showing the location of what was found.

If you have any further questions please do not hesitate to call.

Sincerely,

J.W. Sharp
Business Manager

Enclosure

Field Notes - Raritan Center - Area 4

Access - Off Crawley Rd., this area is very accessible to any unsuspecting individual(s).

Physical Characteristics - Varying from wet and swampy to small hills or mounds.

Ground Cover - thick scrub brush, trees, more growth in the dense brush areas make moving through these areas very difficult. Open areas are flat.

Soil: Mostly sandy, unknown soil composition seem to have prevented vegetation from growing in the flat areas.

Water Table - At or near the surface; some wet swampy areas.

Man-Made Features - Site has many scattered railroad ties that run along the existing railroad tracks; old metal parts with concrete clump-type bases are in the area. Trash and general debris litter the area. The area appears to have been an ordnance steaming area; some residue (pipe fittings and building foundation timber still litter the flats.

Hazards: Bulk explosive is scattered throughout the flat area (see map for detail) with the exception that a small area on the high ground (adjacent to the flats) showed some explosive contamination. These areas were marked off with orange survey tape. The possibility of a recast drum of explosives was found as well as a 9" diameter (empty?) projectile; the projectile was 99% buried. Evidence of explosive residue was found 8" below the surface in the flats. Other "slag type" explosive residues were discovered on the surface as well as 6"-8" below the surface.

General Comments

- The site appears to have been involved in a fire with a possible explosion: both melted H.E., H.E. slag, metal slag and burned material are in the area. Some ordnance frag was found which would indicate a detonation.
- Water run-off through the area appears to be carrying away some bulk explosive through the culvert to an area across the street.

Recommendations:

1. Fence/post area immediately.
2. Perform clearance operation as soon as possible.
3. Investigate more thoroughly the areas that are getting run off.

Post Field Notes

Initial Survey of Area 4

Departed UXB 1400, 6 April 1988

Arrived Ramada Inn 2130, 6 April 1988

0800 - met with Joe Valdes of O'Brien & Gere

1830-1000 - Obtained rain gear and miscellaneous equipment

1030-1300 - Met at area with surveyors from Sailor & Sailor. Placed surveyor's grid stakes at 100' intervals. See drawing.

1300-1630 - Performed surface sweep of area east of railroad track and north of Clover Place. See list of items.

0630-0930 - Performed surface sweep of area south of Clover Place, east of railroad tracks, and west of Reynolds. Nothing found.

All items found in western third

Items Found:

(1) Projectile case 9" diameter, 27" length.

(4) Pad eye nose plugs

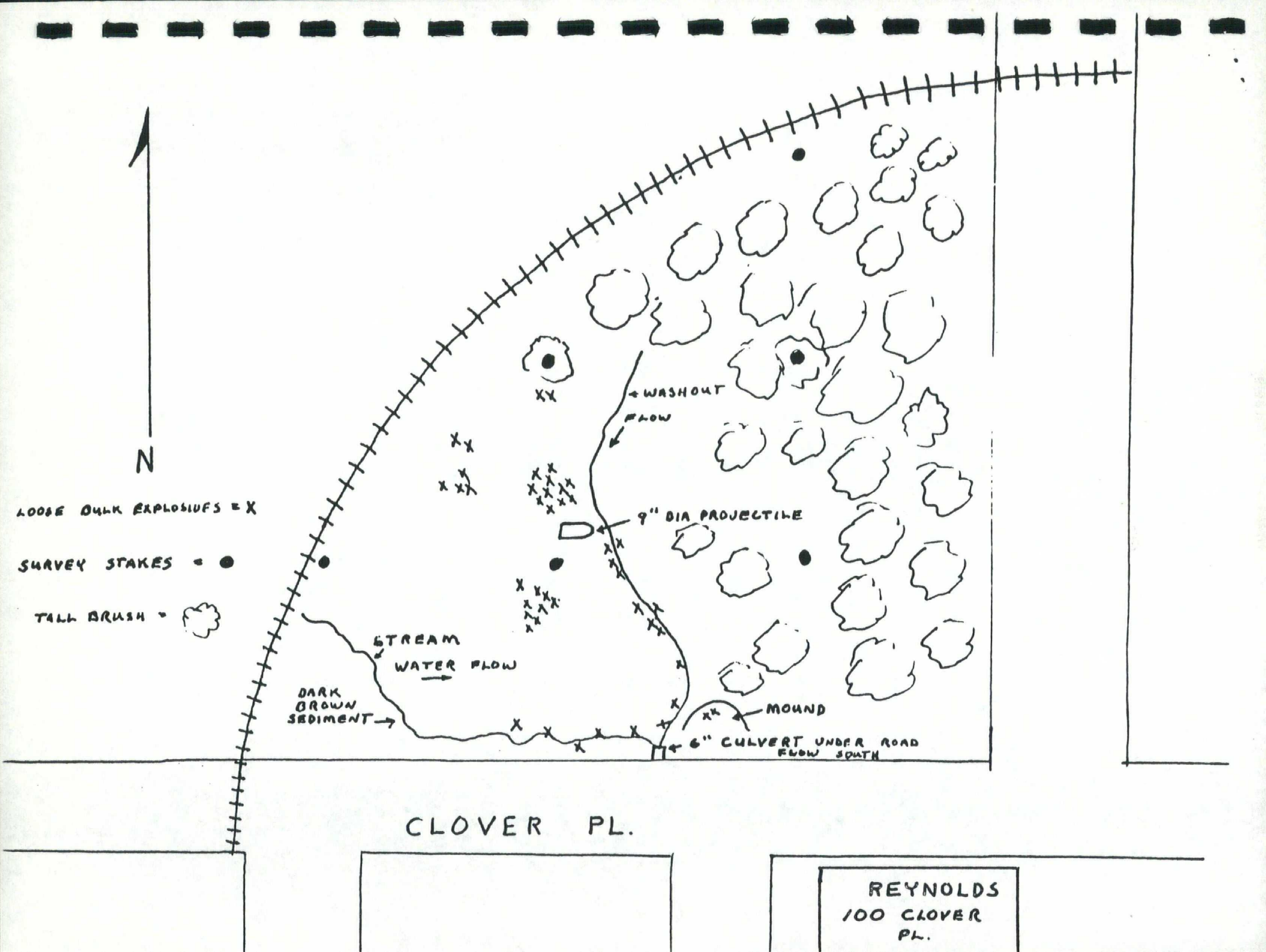
(4) Fuze Adapters

(1) 20 lb. chunk of recast explosives. Numerous piles of scattered loose explosives.

(1) Pad eye with attached 4" L tube

0930 - Departed Edison

1600 - Arrive UXB


N
LOOSE BULK EXPLOSIVES = X
SURVEY STAKES = ●
TALL BRUSH =
WASHOUT FLOW
9" DIA PROJECTILE
STREAM WATER FLOW
DARK BROWN SEDIMENT
MOUND
6" CULVERT UNDER ROAD FLOW SOUTH
CLOVER PL.
REYNOLDS
100 CLOVER PL.

UXB INTERNATIONAL, INC.
4163 CHAIN BRIDGE ROAD • FAIRFAX, VIRGINIA 22030
TELEPHONE 703/385-6622
FAX 703/385-9640

file

July 5, 1988

O'Brien & Gere Engineers, Inc.
Raritan Plaza I, Raritan Center
Fieldcrest Avenue
Edison, N.J. 08817
Attn: Mr. Joseph Valdes

Re: Former Raritan Arsenal Contamination Evaluation

Dear Mr. Valdes:

Enclosed is UXB's field report for Explosive Ordnance Disposal (EOD) ordnance contamination surface and subsurface survey services. UXB International, Inc. must formally state that Site #16, Building #643 is contaminated with large quantities of 25mm projectiles manufactured in 1918. These rounds have a high explosive filler and are base fused. The site should be considered extremely hazardous and immediate action should be taken to deny access to the site by the public and other unauthorized persons. The minimum required would be a fence with notices posted, and the relevant authorities notified of the status of the area.

If you have any further questions, please call us at (703) 385-6622.

Sincerely,

John Boyden

John P. Boyden
Vice President

Enclosures

Field Notes
Raritan Center 26-30 June 1988

UXB Team:
Project Leader - James Ennis
EOD Specialist - Matt Warnock
EOD Specialist - Kevin Lombardo

26 June 1988 - The UXB Team met with Mr. Joe Valdes of O'Brien & Gere (OBG) and discussed the areas to be surveyed. Areas 5 and 10 are on hold at this time and area 16 (Bldg. 643) will be added to this survey.

After touring the areas to be surveyed and observing that grid lines (ref. lines) had not been established; that only corner markers had been put in place, a decision was made to begin in a 90'x90' area known to be contaminated (Area 3). OBG surveyors placed reference stakes 10' apart on North and South ends. Using the White Eagle II and MK 26 ordnance locators, and after completing a surface ordnance search, the UXB team excavated 24 contacts, 20 of which were ordnance related. Only one was considered a potentially hazardous item. At the request of UXB, OBG notified authorities and the hazardous item was removed from the site by Fort Monmouth Army EOD.

Item	Hazard	Depth
9 igniters, grenade type	No hazard	4 to 6"
5 fuzes, base type	No hazard	4 to 6"
2 projectiles	No hazard	12 to 18"
1 projectile	HE Filler	18"
3 projectile pieces of frag	No hazard	6 to 24"
3 pieces of pipe		18 to 30"
1 piece angle iron		6"
Map of fenced area (Encl.1)		

28 June 1988 - Departed the Ramada Inn for the OBG office to drop off a radio and move on to area 11. Again there were no grid (ref. lines) established. The surveyors had placed stakes at 10' intervals North and South. Area 11 is covered with extremely thick marsh grass. After the UXB team completed hacking out grid lines, a surface sweep was conducted. Using the MK 26 ordnance locator, the UXB team excavated 20 contacts, all identified as non-ordnance related.

After completing Area 11 the UXB team moved over to Area 1. Area 1 was marked and flagged in 25' intervals. This area is wooded light brush. After performing surface search noting nothing, subsurface search began. Excavation of contacts was

difficult due to large roots in the area. Area 1 produced 8 contacts, all were non-ordnance related metal.

29 June 1988 - Area 16 (Bldg. 643) which is a known contaminated area, OBG had placed stakes at 10′ intervals. During the surface search, numerous 35mm rounds covering the surface were located. Random excavation uncovered numerous rounds 4 to 6 inches below the surface. Conducting a subsurface search of the area would be difficult, due to the many ordnance items as well as building debris. A perimeter, surface and subsurface search was performed to establish the outer boundary of ordnance contamination. See map (encl. 2) for reference.

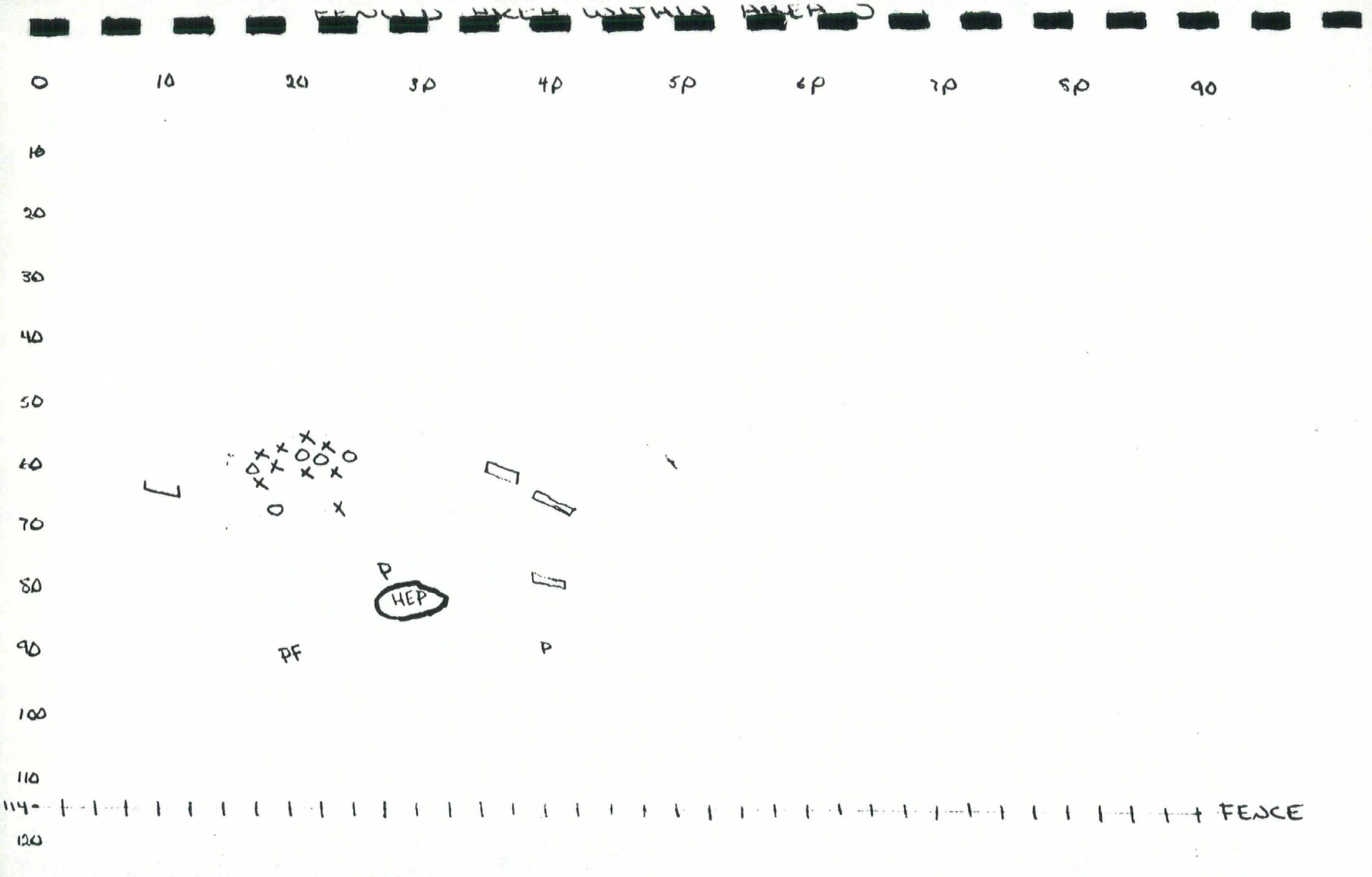
The survey revealed that all ordnance was located within the burned building area with the exception of two rounds, one at 30′ and one at 120′.

OBG rented a brush whacker, for use in this area and also in the marsh. The UXB team extended the search area 40 more feet to the East finding nothing past 120 feet from the original boundary. It was suggested to OBG that access to this area be denied to the public.

Further work in Raritan Center was stopped because Areas 2 and 3 will take 2 additional days for the surveyors to lay out grid lines.

Recommendations:

Due to the potentially hazardous nature of the ordnance items located at Area 16, Bldg. 643, UXB recommends that a fence be placed around the area to deny access by unauthorized personnel. Warning signs should be posted informing the public of the hazard and giving them instructions on what to do if they find an unexploded ordnance item.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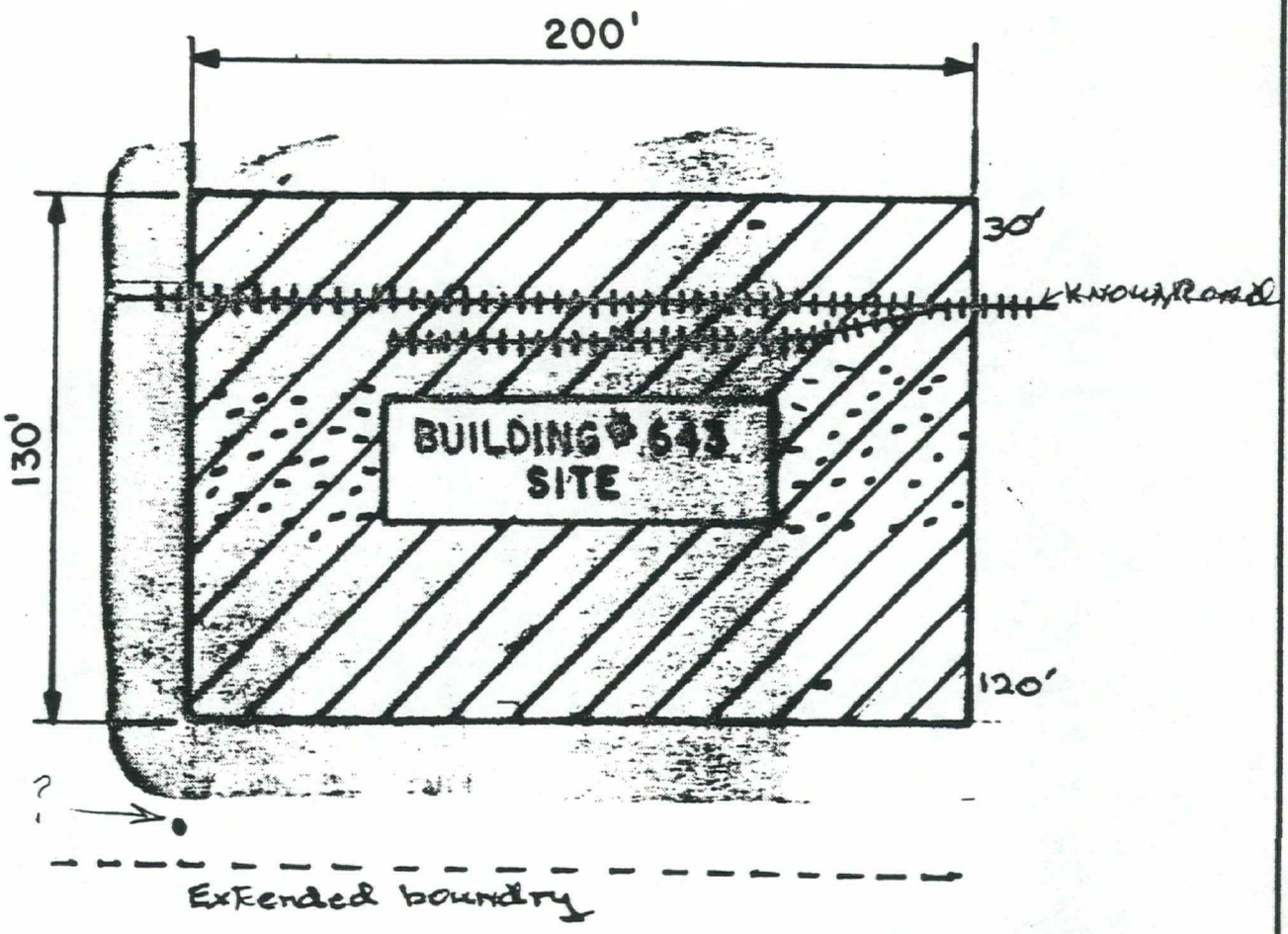
Pipe
Angle Iron
Small Berme

ENCL 1

EXCL II

FIGURE 3-3



Ordnance located in Building area except for two items at 30' and 120' Feet

MAG/GPR SURVEY AREA (LINE SPACING IS 10')

SUSPECTED CONTAMINATION AREA

SCALE 1"= 50' 50 0 50 100

O'BRIEN & GERE ENGINEERS, INC.

AREA 16

MAGNETOMETER/GPR SURVEY PLAN

FILE NO 3068-005

DATE JUNE 1988

DWG NO FIGURE 3-3

Primers. M22 series.

Guns. This round is provided for the 75-mm field guns only.

NOTE: This round is standard for issue and for manufacture (loading with the chemical fillers) with the H, WP, and FS fillers. With the NC and FM fillers it is standard for issue only. Since it is not boresafe it is issued unfuzed.

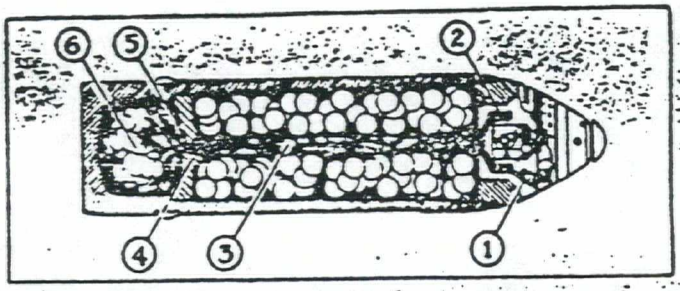
SHRAPNEL, Mk. I.

General. This round, an example of a very early type of artillery ammunition, having been developed in 1784 by Lieutenant Shrapnel, a British officer, is now fast becoming obsolete. Its use against troops in the open is being fulfilled at present by high-explosive shell which have been found to serve this same purpose more efficiently by reason of the large number of jagged steel fragments which they scatter in all directions at a high velocity. Shrapnel is now being used for training in the following rates of issue: 90 percent grade IIR for impact fire only; 10 percent grade I for high-burst ranging. Boxes of grade IIR shrapnel must be marked "FOR IMPACT FIRE ONLY" and, if the box is opened, the data card also must be marked in this manner. This must be done prior to issue of the ammunition.

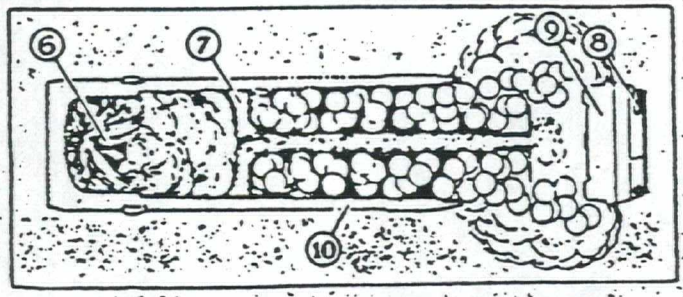
PROJECTILE, Shrapnel, Mk. I. This projectile consists of a steel case, near the base of which a shoulder is formed on the interior surface. A base charge of 3 ounces of black powder is packed in the base of the projectile beneath a diaphragm of steel which rests on the shoulder. This diaphragm also supports a flash tube, the upper end of which is flared out into a smaller thin diaphragm. Between the two diaphragms is held a charge of melted resin which holds 270 lead balls suspended within it. These balls average 42 to the pound, the 270 totaling 6 pounds, 7 ounces. Above the lower diaphragm, the interior of the shrapnel case is gradually enlarged in diameter so that it tapers outward from base to head. The top of the case is closed by a steel head which fastens to the case with a fine thread, and which is adapted to the fuze with a coarse thread. The shrapnel is issued fuzed with the 21-second Combination Fuze M1907M, which is set at safe, and covered with a metallic moisture-proof cap.

Function (fig. 170). The shrapnel projectile is actually a gun within a gun. The flame from the magazine charge (2) of the fuze (1) flashes down the central tube (3) and ignites the black powder base charge (6). In some shrapnel may be found a fiber cup (4) and cloth disc (5). The flash burns through these if they are present. Explosion of this charge forces the lower diaphragm (7), matrix and balls, and flash tube (3) upward, blowing off the fuze (8)

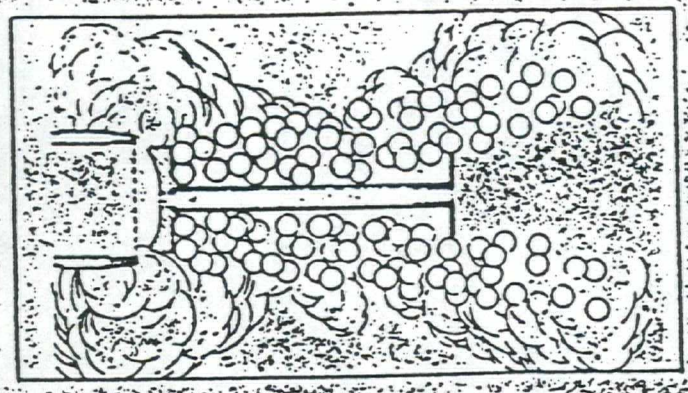
PROJECTILE FROM AREA 3 6/88



ACTION OF FLAME THROUGH CENTRAL TUBE AND IGNITION OF BASE CHARGE



ACTION OF BASE CHARGE AND FORMATION OF SMOKE BALL FROM MATRIX



ACTION OF BASE CHARGE COMPLETED. SMOKE BALL AUGMENTED BY BASE CHARGE. SHRAPNEL BALLS SPREADING TO FORM CONE.

RA PD 22754

Figure 170 — Action of Shrapnel at Time of Burst

COMPLETE ROUNDS FOR 75-MM GUNS

Complete Round	Projectile	Filler	Fuze	Booster	Cartridge Case	Propelling Charge	Primer	Status
Shell, H.E., M48	M48	TNT	M48 M48A1 M54	M20 M20A1	M18 M18B1	FNH Super Normal Reduced	M31 M22A1, A2, A3	S & M
Projectile, APC, M61, W1 B.D. fuze, M66A1	M61	Explosive D	M66A1	.....	M18 M18B1	FNH Super	M31	S & M
Projectile, APC, M61	M61	.....	.....	.....	M18 M18B1	FNH Super	M31	S
Shot, AP, M72	M72	.....	.....	.....	M18 M18B1	FNH Super	M31	S & M
Shell, smoke, HC, B.I., M89	M89	HC	.....	.....	M18 M18B1	FNH 0.219 lb	M31A2	S & M
Shell, H.E., Mk. I	Mk. I	TNT	M46 M47	Mk. III	M18	FNH Normal Reduced	M22A1, A2, A3	S
Shell, chemical, Mk. II	Mk. II	HS, WP, FS	M46	Mk. IV MI	M18 M18B1	FNH Normal	M22A1 A2, A3	S & M
		NC, FM	M46	Mk. IV B	M18	Normal	M22A1, A2, A3	S
Shrapnel, Mk. I	Mk. I Shrapnel case	Lead balls B.P. base charge	M1907M	.....	M18	FNH Normal	M1B1A1	S

and-head (9) as a unit, the rupture occurring at the fine threads between the head and the case (10). The resin matrix is melted and ignited and the lead balls are ejected from the case in a whirling cone-shaped pattern due to the rotation of the projectile. They have a velocity of 350 feet per second in addition to the velocity of the projectile at the time of bursting. The shrapnel case recoils to the rear. The projectile is not weight-zoned, since it is possible to bring it exactly to weight by varying the number of lead balls added at the time of loading. It is painted red and stenciled in black with the designations of weapon, and complete round. The components associated with it in the complete round are:

Fuze M1907M.

Cartridge Case M18.

Propelling Charge. A normal charge of 1.69 pounds of powder which imparts a muzzle velocity of about 1,755 feet per second.

Primer M1B1A1.

Guns. This round is issued for the 75-mm field guns only.

NOTES: This round is standard for issue only and is issued fuzed.

PACKING.

The present standard packing for 75-mm gun rounds is one round per fiber container, three rounds in containers per bundle. Other packings which may be found in storage are:
One round per tin container, 9 rounds per box
One round per fiber container, 9 rounds per box
One round per tin container, 4 rounds per box
One round per fiber container, 4 rounds per box

Overseas Shipment. Bundle packing must be crated in 1-bundle crates which are stained chocolate brown and stenciled in the appropriate color marking for this type of round.

FURTHER REFERENCES: OS—9-20; OS—9-18; TM—9-1900; O.O. 7224, Ordnance Safety Manual; Complete Round Chart No. 5981; SNL R-1; SNL R-3.

Chapter 7

75-mm Howitzer Ammunition

GENERAL.

The 75-mm pack and field howitzers all take the same types of ammunition, namely, at the present time, H.E., A.T. shell, H.E. shell,

UXB INTERNATIONAL, INC.
4163 CHAIN BRIDGE ROAD • FAIRFAX, VIRGINIA 22030
TELEPHONE 703/385-6622
FAX 703/385-9640

September 8, 1988

O'Brien & Gere Engineers, Inc.
Raritan Plaza I, Raritan Center
Fieldcrest Avenue
Edison, N.J. 08817
Attn: Mr. Joseph Valdes

RE: Former Raritan Arsenal Contamination Evaluation

Dear Mr. Valdes:

Enclosed is UXB's Field Report for Explosive Ordnance Disposal (EOD) ordnance contamination surface and subsurface survey services 22-25 August 1988.

If you have any further questions, please call us at (703) 385-6622.

Sincerely,

John Boyden

John P. Boyden
Vice President

Enclosures: Scope of Work
Field Notes

UXB INTERNATIONAL, INC.
4163 CHAIN BRIDGE ROAD • FAIRFAX, VIRGINIA 22030
TELEPHONE 703/385-6622 FAX 703/385-9640

Field Notes
Raritan Center, 22-25 August 1988

UXB Team:

Project Leader: C.E. Wharton
EOD Specialist: J. Thoren

The UXB Team met with Mr. Joseph Valdes of O'Brien & Gere and discussed the various areas to be surveyed.

The UXB Team then cleared the 30 monitoring well locations and recommended some relocations.

Approximately 75% of Area's 2 and 3 were searched with negative results. Area 2 and 3 survey lines were not laid out as originally planned. However, the areas were adequately searched.

One area identified as part of Area 3 Lot 2 was not searched because of the 6-7 feet of back fill covering the site.

A small area west of Areas 2 and 3 was checked by UXB. There was a downed power utility pole with a transformer attached. The transformer was empty and the surrounding ground was void of all vegetation indicating that PCB from the transformer had contaminated that site.

Recommendations

- That O'Brien & Gere geophysics personnel be accompanied by EOD trained personnel during their survey of Areas 2 and 3.
- That any further areas to be electronically swept for ordnance contamination be cleared of brush and/or obstructions to allow a clear path 5' wide prior to UXB attempts to sweep the area.

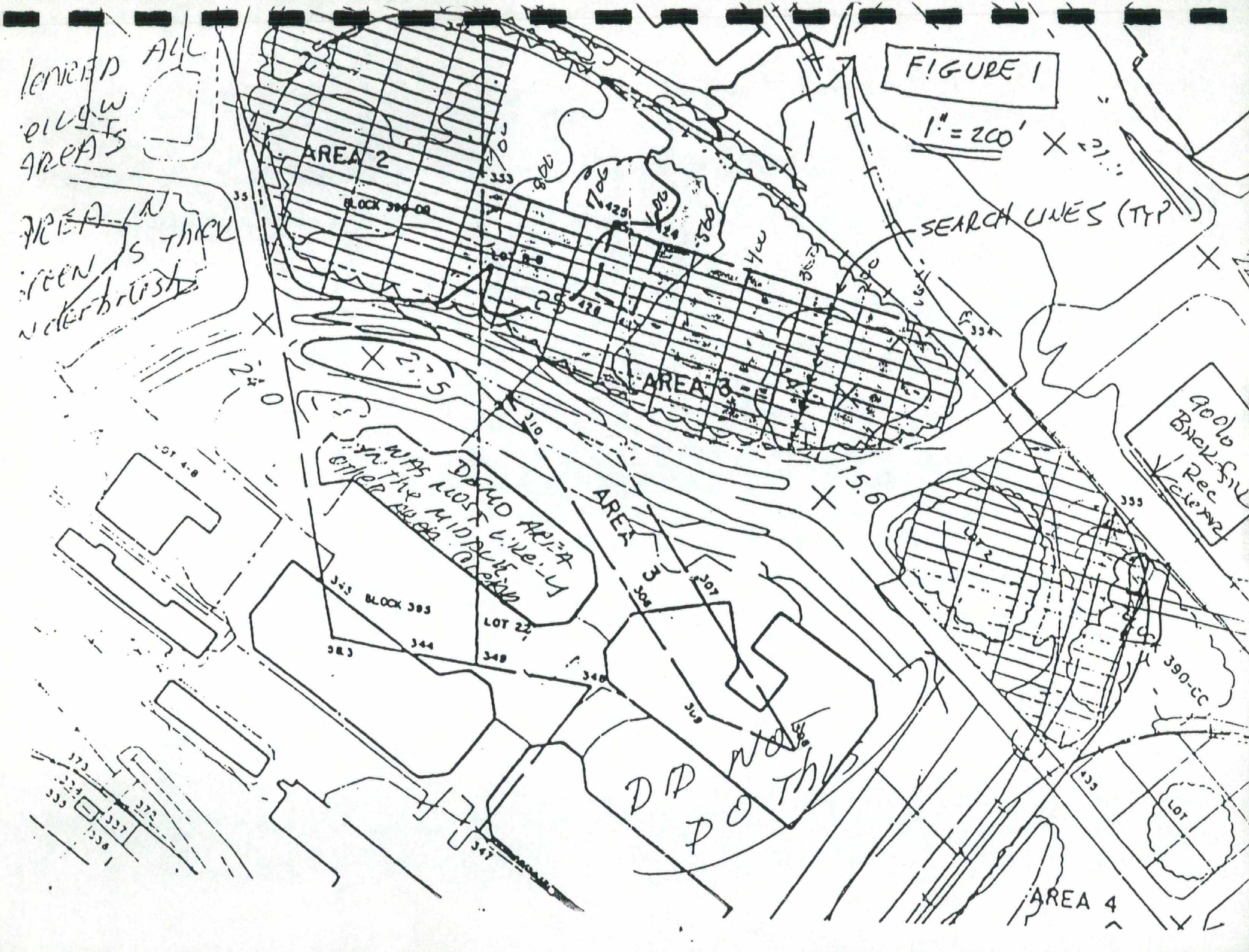


FIGURE 1
1" = 200'
AREA 2
BLOCK 390-DD
AREA 3
AREA 4
SEARCH LINES (TYP)
BLOCK 393
LOT 22
DEMO AREA
390-CC

DATE : December 15, 1988

REPORT TO : O'Brien and Gere
Raritan Plaza One
Edison, New Jersey 08837

FROM : U.X.B. International Inc.
Suite #900
1627 "I" Street N.W.
Washington D.C. 20006

SUBJECT : Contamination Investigation at
Raritan Arsenal
Project Sites: Area #5 , #15

==========

INTRODUCTION:

At the request of O'Brien and Gere, U.X.B. International was commissioned to conduct a remedial investigation of two potentially contaminated hazardous waste sites (Area #5 and Area #15, located on the Raritan Arsenal Project. The investigation was conducted during the period November 14 - December 6, 1988. The U.X.B investigation team consisted of Kevin Lombardo and Bruce Moe.The U.X.B. team was also the primary health and safety representatives on site to ensure adequate levels of protection and decontamination procedures for all personnel involved in activities associated with Area #5.

RESULTS OF INVESTIGATION:

o Suspected contamination of area #5 is likely to contain the following hazardous materials; Cyanide, Red Nitric Acid, Mustards,and unexploded military ordnance.

o Area #15 is an industrial landfill, with a strong possibility of containing explosive contamination and munition residue.

The U.X.B. team performed many functions associated with the investigations conducted on both sites. The following report will contain the observations, findings, and recommendations of the company.

OBSERVATIONS:

Area #5

The Raritan Arsenal Project is bordered by the Raritan Industrial center. The location of Area #5 is adjacent to the United Parcel Service (UPS) center. This center is located well outside the standard fragmentation range associated with chemical weapons. However, given a release of chemical air borne contaminants and strong winds and locating the UPS center in the down wind direction,the center would have to be considered at risk. This possibility must be addressed prior to any subsurface investigation in Area #5.

The site itself was found to have no security that would prevent access to the area. The original wire fence has decayed, and the posted warning signs are illegible. There is a paved access road located on the eastern border that runs north to south. This road can be used in the event emergency response is required to the site. The natural wind direction for the duration of the project tracked from northwest to southeast leaving the UPS center predominantly upwind of the site. The wind fluctuated approximately three to seven knots throughout the project.

Area #5 is recessed inward about 20 yards from the road and not visible due to a natural brush screen. The sites interior is now clear to two inches above grade from brush clearing operations conducted on site. Several open trenches were revealed from prior investigations. Standing timber is sparse. Basically the area is open and clear leaving it ready for continued investigations.

Historical Background

During the site characterization of Area #5, it was discovered that two prior investigations had taken place, one in the early nineteen sixties and mid-seventies. The first study concluded that mustards were still present below the surface, but failed to accurately determine the exact location of the subsurface deposits. The investigations that were conducted in the seventies also yielded the same findings as those of the prior investigations. The seventies investigation retrieved ordnance residue, with active mustard still persistent. The background check also revealed that the site was used to dispose of cyanide in liquid and solid form. (Ref: Reports by Army Corps of Engineers and Raritan Arsenal Historical Records)

Red Nitric Acid was buried on site from the dismantled Nike-Hercules surface to air missile system. This information was not documented but arrived at through interviews with former employees of the center.

Both prior investigations recommended that no subsurface activity should be undertaken, due to the extreme hazards associated with the known contaminants. However, it must be noted that the technology did not exist at the time to conduct the safe, proper investigation and clean-up required to reclaim the land.

FINDINGS OF THE U.X.B. Investigation November-December,1988

This current investigation has revealed some evidence to reaffirm the conclusions of the prior investigations. A surface sweep of the area was conducted prior to brush clearing - it was discovered that prior trenching operations had taken place.

Surface and subsurface samples were extracted from the air, groundwater, and soil to determine if any contaminants were present. Samples were tested specifically for the known contaminants of mustards and cyanide. Sampling and monitoring was conducted as outlined in RCRA 40 CFR, 261. The field tests conducted were semi-quantitative and performed to ensure adequate personnel protection levels were maintained. EPA recommends the use of" Draeger Tubes". The Draeger tube detects cyanide (HCN) levels from 2 to 30 PPM - by drawing an air sample using a manual bellows pump through a filter containing HgCL2. Colorimetric changes of a red indicator reagent measure the HCN concentration. The method used for detection of mustards was the use of the U.S. Army Military M118 Kit. This kit also uses tubes and bellows to determine if a color change takes place.

This investigation for contamination revealed some traces of cyanide from the weak 2PPM to the weak 4PPM. Subsurface sampling, depths and locations can be referenced in the attached field notes. Mustards were not sampled for subsurface on the site but were sampled off site with negative results. Two unknown containers were recovered on the surface of Area #5. (Ref: Photos Attached) Initial tests were negative. However, they are to be considered as chemical storage units.

RECOMMENDATIONS U.X.B. Investigation November - December, 1988

Based on the history of site #5 and surface evidence encountered as well as the testing conducted:

U.X.B. believes that the site must still be considered active.

o If leakage from the containers has occurred then the following must be considered - due to the properties of mustard e.g. its specific gravity is 1.27 (heavier than water) which causes it to migrate below the water table and collect above the natural clay - therefore, it should not migrate but will remain in its present location. This could lead to the emission of extremely toxic vapors through the upper soil layer and into the ground atmosphere.

o If leakage has not occurred and the containers are still partially to totally intact then large amounts of the contaminant will still be present leading to the same potentially dangerous situation.

All reports place the mustard containers at depths of 4 to 5 feet below surface contained in drums or in a military shipping configuration. Also chemical munition canisters may still contain explosives and residues.

For these reasons one must consider the worst case, that the drums are intact or possibly still in the ordnance shipping configuration. The "explosive bursters" may also be intact adding an explosive hazard to the scenario.

U.X.B. recommends the following procedures:

o a sub surface investigation commence in level B protection to conclusively identify the location and remove the suspect ordnance and contamination residue. This operation should include a total site clean up once the area of contamination is determined.

o the level of protection to enter the surface area be a minimum of level C.

o a security fence be erected around the area to limit access.

o another monitoring well be sunk due east of the area to locate any underground migration of all suspected contaminants. This is now the suspected down water gradient path from the site.

o if a subsurface investigation is not continued then the site should remain closed and condemned forever due to the extreme health hazards associated with the known contaminants.

FINDINGS ON AREA #15

U.X.B. was requested to locate the established boundaries of Area #15 (a landfill) on the Raritan Arsenal Project. Historical records and personal interviews disclosed that this site was used as a burial pit for unexploded ordnances. A subsurface investigation of the area was conducted using the Mark 26 Ferrous Ordnance Locator. This area was broken down into 50' x 50' test grids. An initial survey of the area indicates that the area can be considered an "industrial landfill" due to the nature of the debris. No physical or electronic evidence of buried ordnance was found. However, a clear determination could not be made due to the high magnetic concentrations encountered. The area was chartered for these concentrations. (see attached chart for Area #15).

RECOMMENDATIONS BY U.X.B.

U.X.B. believes, that given the inconclusive tests of the initial surface survey of Area #15, the following actions should be taken:

- commence a subsurface investigation of the area.
- locate high concentration readings encountered by Mark 26 and conduct a trenching operation parallel to the contact to determine the identity of the readings (e.g. are they ordnance related readings).
- if immediate removal of the "landfill" is necessary U.X.B. recommends that a "standby" U.X.B. team be present to monitor operations and identify ordnance as "hazardous or residue". This material would be stabilized so removal actions could continue until final disposition. U.X.B. would provide health and safety training in accordance with OSHA standards.

Attachments:

Field Notes
Photographs
Maps

FIELD NOTES

Raritan Arsenal Project - Sites: Areas #5 and #15

U.X.B. Team: Kevin Lombardo, Bruce Moe

Log Entry
13 Nov. 88

Departed Washington, D.C. for Edison, N.J. Arrived in Edison, N. J. and secured rooms at the Ramada Inn. Established contact with Mr. Joe Valdez. Picked up Bruce Moe at Newark Airport and briefed him on the operation.

Log Entry
14 Nov. 88

Met with Mr. Valdez at his office and received maps and background information on Area #5. Met today with Rich Caley, O.B.G., Health and Safety. Also had meetings with Ken Schaal (brush clearing contractor for Area #5) and John Knox (O.B.G. on-site geologist for actual drilling operation) - John Knox is also in charge of subcontractor Empire Well Drilling.

Bruce and I surveyed the area and established boundaries.

Based on the overall site's natural boundaries and a steady wind direction, we were able to locate a safe area and establish a contamination control zone for the duration of the operation.

An entryway was bulldozed into the area to establish an operating Hot Line. We cleared the area for bulldozing with an MK 26 and uncovered an empty drum. We also located a natural gas pipe line that runs north to south along our entry point for Area #5. (It should be noted that further excavation in this area will be needed to address this obstruction).

The location of potable water and the staging of materials has been established as the drill riggers' trailer located on Olympia Drive and Raritan Parkway. This site is used for a final decon of all equipment that is used on the Raritan Project. A final meeting with O.B.G. and all sub-contractors was held at O.B.G. CP. It was decided that morning and evening briefings would be held daily throughout the duration of the project. Health and safety will determine all levels of protection and duration of work schedules for the field teams based on monitoring equipment, current weather and physical condition of the work teams, (i.e. heart rate, physical appearance and alertness).

Log Entry
16 Nov. 88

Had AM meeting with O.B.G. and contractors. Site evaluations on #5 and #15 continue. M118 kit arrived via federal express, samples taken of the outer safe area sites to establish a base line. Bruce and I dressed out in level C to conduct base line survey. Dress out was for training prior to final sampling inside area #5.

Sampling was conducted as follows:

1.) Soil samples taken below surface at depth of eight inches were placed in plastic zip lock bags.

2.) M8 paper swipe taken of soil and analyzed.

3.) Soil will stabilize in bag for 24hrs then be tested by M118 tube test for "Mustards" and Draeger Tube test for Cyanide. (Note: soil was allowed to vent possible gas in bags before air samples taken in bags)

4.) Soil samples for interior of Area #5 conducted exactly as described above.

1600 hrs 16 Nov. 88

First Survey Entry Area #5

Kevin Lombardo, Team Leader
Bruce Moe, Safety Back Up
Hot-Line Manned By Joe Valdez
O.B.G. CP. Health/Safety Rich Caley

Entry to site 5 was for soil sampling and reconnaissance of the interior.

Total number of samples taken: eight

Observations of the interior:

The site is covered with dead trees and shrubs. No ground vegetation on site. Nine open trenches were discovered ranging from about 18 to 30 inches in depth with no sign of back fill. They vary between 6 to 10 feet except for one trench that is estimated to be about 40 to 50 yards long and cuts the site in half. A total of six ten foot high steel poles were sunk in the ground at 25 yard intervals forming a recessed square on the site. This square is recessed about 25 feet inward from the outer fence line (probably a buffer zone for the disposal site). Also a large drum was found with a special interior core that was badly corroded from the inside out. It is most likely a Mustard canister that was excavated during the 1970 investigation. (See Attached Fact Sheet)

An M8 paper test was conducted on all samples taken as well as attaching M8 paper to the teams' boots and a swipe test was done of the decayed container. All M8 paper tests were negative for "Mustard." A large dirt mound at approximately the center of the site was also sampled with a reaction to the M8 paper of faded blue appearing. This reaction is noted for the fact that it is a color change, but does not show up in any reference material with the M118 kit. Total time on site was 1.5 hrs.

The team processed through Hot-Line without any spread of possible contamination.

Team debriefed at evening meeting and concluded operations.

Log Entry
17 Nov. 88

Team met at morning briefing and proceeded to site to conduct tests on base line samples.

Weather: steady rain about 45 degrees. (NOTE: weather/temp/humidity can cause false readings on Draeger tubes).

Team dressed out in level C to conduct tests on base line samples. Ambient air sample was negative. Two (2) samples taken 5 feet outside fence line show weak #2 ppm at 8 inches sub surface for "Cyanide."

All Base line samples test negative for "Mustards." All Base Line samples except above two mentioned, tested negative for "Cyanide". Results reported to O.B.G. CP.

Team leader called manufacturer of tubes to confirm his findings. Manufacturer, plus independent chemist, cite that possible weather conditions could have influenced results of test. Before testing allow interior samples temp. to rise to 60 degrees and rain to stop.

17 Nov. 88

Interior samples were left in direct sun light for 2 hours and rain had stopped. Test proceeded in level C.

Test results:

1) all samples negative for "mustards"

2) 2 of 8 samples negative for "cyanide"

3) Other 6 samples positive for "cyanide" in the weak 2PPM to 4PPM - Only one sample could be considered a strong 2PPM

Team deconned through hot-line and briefed O.B.G. CP.

Team and Joe Valdez discussed findings with independent lab.

Conclusions of lab: Possible Cyanide concentrations remain in low levels near surface, Level C. Dress out acceptable to proceed. Laboratory will give us a small amount of lab cyanide to conduct tests of Draeger tubes to base against any further readings. This should give the team a good comparison to gauge reactions in the tube.

Log Entry
18 Nov. 88

Team briefed the O.B.G. CP. on the procedures to be used during the controlled testing of the laboratory sample. Other work activities to be conducted this day are: sweep areas down water gradient with MK26 for subsurface obstacles. Drill team requires the bulldozer to blaze a road to the two down water well locations. All team members and the bulldozer operator will be dressed out in level C. After the first location is completed the drill team will move in and take bore samples. U.X.B. will monitor every 2 feet for "Mustards and Cyanide." Drill operations will conclude once the clay pack is found.

Due to the fact that "Mustards" specific gravity is heavier than water, it is suspected that any leeching out will occur at the clay pack level. The testing for cyanide will continue in all samples in an effort to determine what levels of concentration are met and at what specific level. Any positive readings greater than five PPM will cause an immediate halt to the operation and a capping of the well.

A concentration of 5 PPM or greater requires an upgrade of personal protection to level B.

18 Nov. 88

First testing of subsurface concentrations began on down water gradient well. The following are the results of tests for "Cyanide".

1. 2 Feet Subsurface - 2PPM Very Weak

2. 4 Feet Subsurface - 2PPM Weak

3. 6 Feet Subsurface - 2PPM Weak to 4PPM Very Weak

4. 8 Feet Subsurface - 2PPM Strong to 4PPM Weak

5. 10 Feet Ground water table - No reaction in tube (Note: Cyanide is water soluble and would be carried off at the water table)

6. 12 Feet - Negative results
Test results for "Cyanide Area #5 down water well continued

7. 14 Feet - Negative Results

8. 16 feet - Negative results

9. 18 Feet - Negative results

10. 20 Feet - Negative results

11. 22 Feet - Negative results
(Note: drillers have not hit clay pack at 22 feet and the operation was suspended due to break down in drill rig. Well capped for weekend. Well and drill rig gross decon completed - operations Area #5 concluded for weekend.)

From zero to 22 feet all tests for Mustards were negative.

Bulldozer operations were completed for well site #2 and operations suspended. U.X.B. team will work tomorrow, 19 Nov. on site Area #15 and conclude map and charting operations on the subsurface investigation.

The afternoon will be used for preventive maintenance on equipment.

<u>OBSERVATION</u>:

Today's wind direction was steady from the due west at about 15 mph. All drilling activities were conducted upwind of the well as much as possible.

O.B.G. C.P. briefed on the days tests and results. O.B.G. Site geologist J. Knox suspects that the clay pack will be encountered between 30 to 40 feet based on soil samples taken from well. U.X.B. will continue well sampling when drilling resumes.

Log Entry:
19 Nov. 88

U.X.B. Team continued area survey for site 15, heavy subsurface contacts continue to be logged and charted. Area has filled with rain water from yesterday. Team has noted some evidence of a prior trenching operation in the northeast section. After investigation of contacts with MK 26, items were excavated and identified as badly decomposed iron rods, and steel shavings about one inch square. The residue is similar to items found in a machine shop operation.

OBSERVATION:

All contacts that were investigated subsurface and encountered on the surface were identified as items one would associate with a large scale industrial operation.

NOTE: A Metal Warning Sign was Found on Site "DANGER EXPLOSIVE CONTAMINATION AREA" This sign is now in Joe Valdez's possession.

Log Entry
21 Nov. 88

Drill operations continue on the down grade well, started on 18 Nov.

U.X.B. Team continues to monitor the well and bore samples. Air samples taken from the sealed well head were negative. The well cap was removed and drilling and monitoring continued. The clay pack was reached at the 36 foot mark. Sampling for Mustard was conducted, results of the clay pack were negative.

NOTE: A large amount of fresh water had to be injected into the well, this is a normal procedure. However, by the injection of fresh water into the well, test results can not be conclusive.

Drill operations for this day concluded, personnel and equipment decontaminated. Drilling equipment positioned on second down grade well for operations tomorrow. O.B.G. C.P. briefed at evening meeting on the days findings.

Log Entry
22 Nov. 88

Drilling operations continue on down gradient monitoring well #20. U.X.B. Team will continue water, air and soil sampling for personnel protection. This well location is in the middle of the down water plume suspected of containing area #5 contamination.

Wind direction is due east at about 5 mph. Weather clear.

Samples taken of standing ground water test negative for mustard and cyanide. Well drilling operation takes the entire day. Well depth is about 30 feet.

All monitoring results negative for "mustards and cyanides". O.B.G. geologist J. Knox believes that underground water flow is tracking under area #5 and continuing in an easterly direction. Based on drill samples it is believed that we have missed the plume.

NOTE: The monitoring wells that have been established are located south and north of Area #5. It was believed that the underground water had been tracking north to south towards "Black Ditch." However, it is now believed to be tracking west to east towards the Raritan River. There are no wells proposed east of Area #5.

Log Entry
23 Nov. 88

Drilling operations continue today on the last monitoring well NW 22. Bore and water samples will be taken as described earlier. This well is located north of area #5 and suspected as up gradient. This location is about 200 yards north of the site. Ground and brush clearing operations have not yet started on site #5.

This well was sunk to a depth of 24 feet and is located in a natural bog. All sampling again is negative for "mustards and cyanides." Operations on all well investigations are completed. Equipment, Hot Line and Area #5 are secure for the holidays. U.X.B. Team will start brush clearing operations on 28 Nov. Well development will start on 29 Nov. Over the holidays U.X.B. Team chief will secure Level B protection for stand-by use in development of wells.

During the development of the wells a procedure called "surging" is used. This procedure causes a vacuum effect below the surface. Water that has been introduced to the well from the surface is now removed. Once removed subsurface ground water will migrate into the well filling the void that was left. Such suction is created that the flow of subsurface

water beneath Area #5 will be drawn to the well. For this reason, it is suspected that the possibility could occur of large amounts of contamination travelling with the water will combine in a confined space of the well tube. The vapors given off in this space could rapidly exceed the level C. protection outlined in OBG Health, Safety Plan. Material Safety Data Sheet (MSDS) state that Level C protection is adequate below 5PPM. It is viewed that this threshold could be breached rapidly given cyanide's low threshold. So as to be sure, we are prepared for this situation. The monitoring well will be done in level B and drillers will work upwind of the tube in level C. If the threshold is reached operation will stop and the well be sealed. This will allow the drillers to updress to Level B.

Log Entry
24 Nov. 88

Thanksgiving Day, 1988. Operations terminated for Phase I of Area #5 project. Bruce Moe departs Newark Airport for Wisconsin via Northwest Airlines. Team leader departs for Washington DC via ground transportation. Area #5 secure. Team will reassemble 27 Nov. at Ramada Inn, Edison, NJ to complete Phase II of Area #5 project. Bruce Moe will arrive via air transport evening of Nov 27. Team leader will arrive via ground transportation morning of Nov 28.

Log Entry
25 Nov. 88

Team leader departs Wash. DC for BISS safety consultants in Baltimore.

Due to an error in shipment U.X.B. is returning 20 cases of Draeger Cyanide Testing Tubes, then returns to Washington.

Log Entry
26 Nov. 88

Team leader prepares notes and completes administrative duties.

Log Entry
27 Nov. 88

Bruce Moe returns to Ramada Inn, Edison, NJ for start of Phase II of Area #5. Team leader picks up Level B equipment from U.X.B Vint Hill Station. Return to Washington DC. Performs preventive maintenance on equipment and readies van for return trip to Edison, NJ. Team leader will depart 0030 hours 28 Nov.

Log Entry
28 Nov. 88

U.X.B. team has assembled and is in operational readiness. Team meets with O.B.G. CP. and other sub-contractors for morning briefing. Joe Valdez and Rich Caley concur that U.X.B. team leader Kevin Lombardo will be on-site senior Health and Safety Representative.

Water samples taken today will take 3 days for analysis. When results are returned to O.B.G. CP. a decision will be made at that time to determine level of personal protection required. No operation requiring sub-surface activities will be conducted until results of test are received.

Site investigations will continue on the surface of Area #5 to include brush clearing. Area #15 investigations will also continue. Boring operations are projected for this area later in the week depending on weather conditions.

NOTE: U.X.B team will p/u and transport lab samples from lab to site and site to lab.

Bio Pak-60, Breathing apparatus, O_2 Bottles Filled and placed in service. U.X.B. team ready to provide Level B protection if required.

Note: Main gate to Area #5 has been broken down. The construction of the gate was welded 4 inch steel pipe. As of 20 Nov. evening no barrier to the site was present.

U.X.B. team posted warning signs at the entrance: "Danger Restricted Area No Trespassing"

Log Entry
29 Nov. 88

Area #15 investigation continues. Well locations and Bore locations spotted with MK-26. Soil Sample locations charted, Area staked, locations marked with 3 foot wooden stakes painted orange and assigned quadrant numbers for the site.

Area #5, outer perimeter has been extended out about 35 feet in all directions from the site. The Area is marked off with "Police Line Do Not Cross" tape in blaze yellow. Also blaze Red "Danger Do Not Cross" tape. U.X.B. team has erected this barrier . U.X.B team also has strung a line of yellow tape at the top of the existing fence line to clearly define the area.

Capt. Shirley of the Edison Emergency Management Team stopped by the site for a briefing on the current status of operations and looked over the security problems of the site.

Results of water samples have not come back. No entry to interior of site five. U.X.B team dressed out in Level C for security barrier construction.

Log Entry
30 Nov. 88

U.X.B. team briefed on brush clearing operations that are to start today. Equipment to be used; 1978 Hydro-Ax, four wheel drive vehicle, 13 ton heavy duty brush hog. This morning was spent with familiarization of the equipment, safety briefings and a demonstration of use by the owner. The owner prepared a strip of land outside of Area #5 for the demonstration.

NOTE: During the demonstration the Hydro-Ax strayed into area #5 causing a disturbance to the ground. All operations were halted, and the operator and machine, were deconned. U.X.B Team dressed out in level B to investigate the area.

Findings: The Hydro-Ax had driven over a sub-surface burial pit, and the weight of the machine sunk in about 30 inches, exposing an open hole, and a grey to white milky material. The wind direction was due south and away from any population. U.X.B. Team conducted sampling of the material to determine if any hazard existed, also collected a sample to be investigated later by a laboratory. This material is man-made and not consistent with any soil samples taken anywhere on the project. The team backfilled the hole with dirt and processed through the hot-line. Results of field test were negative for mustards and cyanide. No trace of any contamination was airborne and no hazard to the field teams or the workers at the UPS facility.

Actions and Findings reported to the O.B.G. CP.

Operator of the Hydro-Ax briefed on outcome of the testing, and instructed to forego brush clearing operations in SW corner until the ground can dry out and firm up. Brush clearing operations will start tomorrow inside the area.

Log entry
1 Dec. 88

Brush clearing operations started inside Area #5. U.X.B. Team dressed out for response. Hot-Line in place and operational. Brush operations continued all day with out incident. Operations concluded and will resume tomorrow.

NOTE: About 20 percent of the surface cleared, operation slow.

Log Entry
2 Dec. 88

Operations continue inside Area #5. Development of upgradient well will start this afternoon. U.X.B. Team will stand by in level B as a safety precaution. Results of water sample test taken to lab are negative. However, this was purge water checked and not conclusive.

NOTE: During brush clearing operations today the hydro-axe broke the surface with its rotating blade and skid. Operations halted immediately as the operator reported an unidentified gray to millky white (chalky) substance showing through the topsoil. U.X.B. team made an emergency site entry to analyze the substance to determine its toxicity.

Findings: Initial visual observation indicated that the substance appeared to be the same as that discovered earlier in the week in the open cavity at the southeastern end of the site. It appears to be the same man-made substance. It was determined that it did not pose any immediate threat to life or the environment. Testing results negative for mustards and cyanide.

Conclusion: It must be assumed that this is probably the backfill area of a suspect pit and the area must be treated as such.

U.X.B. deconned out of the area without incident - hydro-axe operations continued. Operator instructed to suspend operation in this area.

Log Entry
3 Dec. 88

U.X.B. Team on site and standing by for today's operations. Brush clearing and development of monitoring well MW20. All operations completed and no incidents to report.

Log Entry
4 Dec. 88

U.X.B. Team on site and dressed out for the operations taking place today. All operations concluded today. U.X.B. Team will demobilize and leave on 6 December.

Log Entry
6 Dec. 88

Demobilization complete, team breaks down and departs.

100 MUNICIPAL BOULEVARD, EDISON, NEW JERSEY
08818

COUNTY OF MIDDLESEX
201 - 287 - 0900

EDISON
New Jersey

November 29, 1988

CONFIDENTIAL

Ref: CONTAMINATION EVALUATION WORK OR STUDY BEING DONE AT THE FORMER RARITAN ARSENAL, AREA # 5, RARITAN CENTER, EDISON, NEW JERSEY.

IT IS BELIVED THAT CYANIDE AND MUSTARD GAS WAS BURIED AT THIS LOCATION AFTER THE FIRST WORLD WAR.

INCLOSED IS TECHNICAL INFORMATION ABOUT POTASSIUM CYANIDE AND MUSTARD GAS FOR FIRST RESPONDERS , EMS , AND AREA HOSPITALS.

POTASSIUM CYANIDE

AVOID CONTACT WITH SOLID, DUST AND WATER SOLUTION

Keep People Away
Wear chemical protective suit with self contained breathing apparatus
Isolate and remove discharged material
Notify local health and pollution control agencies

EXPOSURE - CALL FOR MEDICAL AID

DUST
POISONOUS IF INHALED OR IF SKIN IS EXPOSED
Move to fresh air
If breathing has stopped, give artifical respiration
If breathing is difficult, give oxygen

SOLID
POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED
Irritating to eyes
Remove contaminated clothing and shoes
Flush affected areas with plenty of water
IF IN EYES, hold eyelids open and flush with plenty of water
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting
IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS do nothing except keep victim warm

CHEMICAL DESIGNATIONS

CQ Compatability Class: Not listed
Formula: KCN
IMO/UN Designation 6.1/1680
DOT ID No: 1680
CAS Registry No: 151-50-8

OBSERVABLE CHARACTERISTICS

Physical State (as shipped) Solid
Color: White
Odor: Like hydrogen cyanide, almond-like

HEALTH HAZARDS

Personal Protective Equipment - Wear dry cotton gloves and U.S. Bureau of Mines approved dust respirator when handling solid potassium cyanide. Wear rubber gloves and approved chemical safety goggles when handling solution.

Symptons Following Exposure - is a rapidly fatal poison when taken into the digestive system. Dust may cause toxic symptons when inhaled and prolonged contact with the skin may cause irritation and possibly poisoning if skin is broken. Strong solutions are corrosive to skin and may cause deep ulcers that heal slowly.

Treatment of Exposure - INGESTION - call physician immediately, have victim lie down and keep him quiet and warm. If he is CONSCIOUS, induce vomiting by having him drink warm salt water (1 tablespoon per cup of water) repeat until vomit fluid is clear, then give

only 1 pint of 1% solution of sodium thiosulfate to be repeated in 15 minutes. If victim is NOT BREATHING, give artificial respiration until breathing starts. If victim is UNCONSCIOUS BUT BREATHING, give oxygen from an inhalator if he does not respond to treatment. In all cases break an amyl nitrite pearl in a cloth and hold lightly under victim's nose for 15 seconds, repeating 5 times at about 15 second intervals. If necessary, repeat procedure every 3 minutes with fresh pearls until 3 or 4 have been used. Amyl nitrite pearls must not be over 2 years old. Avoid breathing the vapor while administering it to the victim.

Threshold Limit Value: 5 mg/m

Short Term Inhalation Limits: Not pertinent

Toxicity by Ingestions Grade 4: LD below 50mg/kg (mice)

Late Toxicity: None

Vapor (Gas) Irritant characteristics: Non-volatile, but moisture in air can't tolerate some lifted hydrogen gas.

Liquid or Solid Irritant Characteristics: Moist solid can cause caustic-type irritation of skin and formation of ulcers.

Odor Threshold: Not pertinent.

IDLH Value: 50mg/m.

POTASSIUM CYANIDE

PTC

Common Synonyms
Cyanide

Solid crystals. White. Almond odor

Sinks and mixes with water

AVOID CONTACT WITH SOLID, DUST AND WATER SOLUTION.
Keep people away.
Wear chemical protective suit with self-contained breathing apparatus.
Isolate and remove discharged material.
Notify local health and pollution control agencies.

Fire

Not flammable.

Exposure

CALL FOR MEDICAL AID

DUST
POISONOUS IF INHALED OR IF SKIN IS EXPOSED.
Move to fresh air.
If breathing has stopped, give artificial respiration.
If breathing is difficult, give oxygen.

SOLID
POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED.
Irritating to eyes.
Remove contaminated clothing and shoes.
Flush affected areas with plenty of water.
IF IN EYES, hold eyelids open and flush with plenty of water.
IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting.
IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.

Water Pollution

HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS.
May be dangerous if it enters water intakes.

Notify local health and wildlife officials.
Notify operators of nearby water intakes.

1. RESPONSE TO DISCHARGE

(See Response Methods Handbook)
Issue warning-poison
Restrict access
Evacuate area
Chemical and physical treatment

2. LABEL

2.1 Category: Poison
2.2 Class: 6

3. CHEMICAL DESIGNATIONS

3.1 CG Compatibility Class: Not listed
3.2 Formula: KCN
3.3 IMO/UN Designation: 6.1/1680
3.4 DOT ID No.: 1680
3.5 CAS Registry No.: 151-50-8

4. OBSERVABLE CHARACTERISTICS

4.1 Physical State (as shipped): Solid
4.2 Color: White
4.3 Odor: Like hydrogen cyanide, almond-like

5. HEALTH HAZARDS

5.1 Personal Protective Equipment: Wear dry cotton gloves and U.S. Bureau of Mines approved dust respirator when handling solid potassium cyanide. Wear rubber gloves and approved chemical safety goggles when handling solutions.

5.2 Symptoms Following Exposure: Is a rapidly fatal poison when taken into the digestive system. Dust may cause toxic symptoms when inhaled, and prolonged contact with the skin may cause irritation and possibly poisoning if skin is broken. Strong solutions are corrosive to skin and may cause deep ulcers that heal slowly.

5.3 Treatment of Exposure: INGESTION: call physician immediately; have victim lie down and keep him quiet and warm. If he is CONSCIOUS, induce vomiting by having him drink warm soap water (1 tablespoon per cup of water); repeat until vomit fluid is clear; then give orally 1 pint of 1% solution of sodium thiosulfate, to be repeated in 15 min. If victim is NOT BREATHING, give artificial respiration until breathing starts. If victim is UNCONSCIOUS BUT BREATHING, give oxygen from an inhalator if he does not respond to treatment. In all cases, break an amyl nitrite pearl* in a cloth and hold tightly under victim's nose for 15 sec., repeating 5 times at about 15-sec. intervals; if necessary, repeat procedure every 3 min. with fresh pearls until 3 or 4 have been used. *Amyl nitrite pearls must not be over 2 years old. Avoid breathing the vapor while administering it to the victim.

5.4 Threshold Limit Value: 5 mg/m³

5.5 Short Term Inhalation Limits: Not pertinent

5.6 Toxicity by Ingestion: Grade 4; LD_{50} below 50 mg/kg (mice)

5.7 Late Toxicity: None

5.8 Vapor (Gas) Irritant Characteristics: Non-volatile, but moisture in air can liberate some lethal hydrogen cyanide gas.

5.9 Liquid or Solid Irritant Characteristics: Moist solid can cause caustic-type irritation of skin and formation of ulcers.

5.10 Odor Threshold: Not pertinent

5.11 IDLH Value: 50 mg/m³

6. FIRE HAZARDS

6.1 Flash Point: Not flammable
6.2 Flammable Limits in Air: Not flammable
6.3 Fire Extinguishing Agents: Not pertinent
6.4 Fire Extinguishing Agents Not to be Used: Not pertinent
6.5 Special Hazards of Combustion Products: Not pertinent
6.6 Behavior in Fire: Not pertinent
6.7 Ignition Temperature: Not flammable
6.8 Electrical Hazard: Not pertinent
6.9 Burning Rate: Not flammable
6.10 Adiabatic Flame Temperature: Data not available
6.11 Stoichiometric Air to Fuel Ratio: Data not available
6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: When potassium cyanide dissolves in water, a mild reaction occurs and some poisonous hydrogen cyanide gas is released. This gas is not hazardous except in an enclosed space. If the water is acidic, however, toxic amounts of the gas will form at once.

7.2 Reactivity with Common Materials: Contact with even weak acids causes formation of deadly hydrogen cyanide gas.

7.3 Stability During Transport: Stable

7.4 Neutralizing Agents for Acids and Caustics: Not pertinent

7.5 Polymerization: Not pertinent

7.6 Inhibitor of Polymerization: Not pertinent

7.7 Water Reactivity (Reactant to Products): Data not available

7.8 Reactivity Groups: Data not available

8. WATER POLLUTION

8.1 Aquatic Toxicity:
0.16 ppm/48 hr/bluegill/TL_m/fresh water
0.40 ppm/48 hr/adult saltwater/TL_m/salt water

8.2 Waterfowl Toxicity: Data not available

8.3 Biological Oxygen Demand (BOD): 0% of Theoretical in 7 days

8.4 Food Chain Concentration Potential: None

9. SHIPPING INFORMATION

9.1 Grades of Purity: 98.0%

9.2 Storage Temperature: Ambient

9.3 Inert Atmosphere: No requirement

9.4 Venting: Sealed containers must be stored in a well-ventilated area.

10. HAZARD ASSESSMENT CODE

(See Hazard Assessment Handbook)
SS

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: Poison, B

11.2 RAS Hazard Rating for Bulk Water Transportation: Not listed

11.3 NFPA Hazard Classification:

Category	Classification
Health Hazard (Blue)	3
Flammability (Red)	0
Reactivity (Yellow)	0

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 15°C and 1 atm: Solid

12.2 Molecular Weight: 65.12

12.3 Boiling Point at 1 atm: Very high

12.4 Freezing Point: 1174.1°F = 634.5°C = 897.7°K

12.5 Critical Temperature: Not pertinent

12.6 Critical Pressure: Not pertinent

12.7 Specific Gravity: 1.52 at 16°C (solid)

12.8 Liquid Surface Tension: Not pertinent

12.9 Liquid Water Interfacial Tension: Not pertinent

12.10 Vapor (Gas) Specific Gravity: Not pertinent

12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent

12.12 Latent Heat of Vaporization: Not pertinent

12.13 Heat of Combustion: Not pertinent

12.14 Heat of Decomposition: Not pertinent

12.15 Heat of Solution: Not pertinent

12.16 Heat of Polymerization: Not pertinent

12.17 Heat of Fusion: 53.7 cal/g

12.18 Limiting Value: Data not available

12.19 Reid Vapor Pressure: Data not available

NOTES

U.S. ARMY CHEMICAL
RESEARCH, DEVELOPMENT
AND ENGINEERING CENTER

Emergency Telephone #s:
CRDEC Safety Office
301-671-4411 0800-1630
EST After normal duty
hours: 301-278-5201
Ask for CRDEC Staff
Duty Officer

HD, AND THD (See Addendum A)

MATERIAL SAFETY DATA SHEET

SECTION I - GENERAL INFORMATION

MANUFACTURER'S NAME: Department of the Army

MANUFACTURER'S ADDRESS: U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND
CHEMICAL RESEARCH DEVELOPMENT AND ENGINEERING
CENTER
ATTN: SMCCR-SFS
ABERDEEN PROVING GROUND, MD 21010-5423

CAS REGISTRY NUMBER: 505-60-2, 39472-40-7, 68157-62-0

CHEMICAL NAME AND SYNONYMS:

Ethane, 1,1' -thiobis (2-chloro-)
Sulfide, bis (2-chloroethyl)
Bis(beta-chloroethyl)sulfide
Bis(2-chloroethyl)sulfide
1-chloro-2(beta-chloroethylthio)ethane
beta, beta'-dichlorodiethyl sulfide
2,2'dichlorodiethyl sulfide
Di-2-chloroethyl sulfide
beta, beta'-dichloroethyl sulfide
2,2'-dichloroethyl sulfide

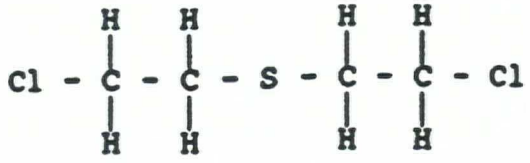
TRADE NAME AND SYNONYMS:

HD	Senfgas	H
Sulfur mustard	S-lost	HS
Iprit	Sulphur mustard gas	
Kampstoff "Lost"	S-yperite	
Lost	Yellow Cross Liquid	
Mustard Gas	Yperite	

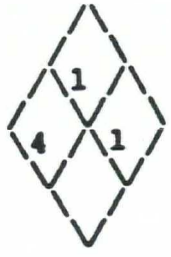
CHEMICAL FAMILY: chlorinated sulfur compound

FORMULA/CHEMICAL STRUCTURE:

C4(H8)C12(S)



NFPA 704 SIGNAL: Health - 4
Flammability- 1
Reactivity- 1



INGREDIENTS NAME	FORMULA	PERCENTAGE BY WEIGHT	RECOMMENDED EXPOSURE LIMIT
Sulfur Mustard	C4(H8)Cl2(S)	100	0.003 mg/m3

SECTION III - PHYSICAL DATA

BOILING POINT DEG F (DEG C): 422 DEG F (217 DEG C)

VAPOR PRESSURE (mmHg): 0.072 mm Hg @ 20 DEG C (0.11 mm Hg @ 25 DEG C)

VAPOR DENSITY (AIR=1): 5.5

SOLUBILITY IN WATER: Negligible. Soluble in acetone, CH3(Cl), tetrachloroethane ethylbenzoate, and ether.

SPECIFIC GRAVITY (H2O=1): 1.27 @ 20 DEG C

VOLATILITY: 610 mg/m3 @ 20 DEG C
920 mg/m3 @ 25 DEG C

APPEARANCE AND ODOR: Water clear if pure. Normally pale yellow to black. Slight garlic type odor. The odor threshold for HD is 0.0006 mg/m3

SECTION IV - FIRE AND EXPLOSION DATA

FLASHPOINT (METHOD USED): 105 DEG C (ignited by large explosive charges)
122 DEG C (McCutchen-Young)

FLAMMABILITY LIMITS (% by volume): Unknown

EXTINGUISHING MEDIA: Water, fog, foam, CO2. Avoid use of extinguishing methods that will splash or spread mustard.

SPECIAL FIRE FIGHTING PROCEDURES: Full protective clothing (see Section) and full respiratory protection must be worn when fighting fires inside buildings and areas where mustard agents are stored. Full protective clothing and canister or filter type masks can be worn where oxygen deficiency is not a problem. All persons not engaged in extinguishing the fire should be evacuated. Skin contact and inhalation of HD and its vapors must be avoided at all times. Although the fire may destroy most of the HD, care must be taken to assure that the HD does not contaminate uncontrolled areas and that the fire fighters are adequately protected from physical contact with the agent and agent fumes. Contact can be fatal.

SECTION V - HEALTH HAZARD DATA

RECOMMENDED EXPOSURE LIMIT(REL): Since HD is a carcinogen, airborne exposure should be controlled to the lowest feasible limit. No individual should be intentionally exposed to any direct skin or eye contact or any detectable airborne concentration. Presently, the detection limit is 0.003 mg/m3 as a -hour time-weighted average (TWA). As the analytical method improves, the EL will be lowered.

EFFECTS OF OVEREXPOSURE: HD is a vesicant (causing blisters) and alkylating

the body is very slow and repeated exposures produce a cumulative effect. Median doses of HD in man are:

LD50 (skin) = 100 mg/kg
ICt50 (skin) = 2000 mg-min/m3 at 70 - 80 DEG F (humid environment)
= 1000 mg-min/m3 at 90 DEG F (dry environment)
ICt50 (eyes) = 200 mg-min/m3
ICt50 (inhalation) = 1500 mg-min/m3 (Ct. unchanged with time)
LD50 (oral) = 0.7 mg/kg

Maximum safe Ct for skin and eyes are 5 and 2 mg-min/m3, respectively.

ACUTE PHYSIOLOGICAL ACTION OF HD IS CLASSIFIED AS LOCAL AND SYSTEMIC.

LOCALLY, HD affects both the eyes and the skin. SKIN damage occurs after percutaneous resorption. Being lipid soluble, HD can be resorbed into all organs. Skin penetration is rapid without skin irritation. Swelling (blisters) and reddening (erythema) of the skin occurs after a latency period of 4-24 hours following the exposure, depending on degree of exposure and individual sensitivity. The skin healing process is very slow. Tender skin, mucous membrane and perspiration covered skin are more sensitive to the effects of HD. HD's effect on the skin, however, is less than on the eyes. Local action on the eyes produces severe necrotic damage and loss of eyesight. Exposure of eyes to HD vapor or aerosol produces lacrimation, photophobia, and inflammation of the conjunctiva and cornea.

SYSTEMIC ACTIONS occur primarily through inhalation and ingestion. The HD vapor or aerosol is less toxic to the skin or eyes than the liquid form. When inhaled, the upper respiratory tract (nose, throat, trachea) is inflamed after a few hours latency period, accompanied by sneezing, coughing, and bronchitis, loss of appetite, diarrhea, fever, and apathy. Exposure to nearly lethal dose of HD can produce injury to bone marrow, lymph nodes, and spleen as indicated by a drop in WBC count and, therefore, results in increased susceptibility to local and systemic infections. Ingestion of HD will produce severe stomach pains, vomiting, and bloody stools after a 15-20 minute latency period.

CHRONIC EXPOSURE to HD can cause sensitization, chronic lung impairment, (cough, shortness of breath, chest pain), and cancer of the mouth, throat, respiratory tract, skin, and leukemia. It may also cause birth defects.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION. Remove from the source IMMEDIATELY. If breathing has stopped, give artificial respiration. If breathing is difficult, administer oxygen. Seek medical attention IMMEDIATELY.

EYE CONTACT. IMMEDIATELY flush eyes with water for 10-15 minutes, pulling eyelids apart with fingers and pouring water into eyes. Do not cover eyes with bandages. After flushing eyes with water protect eyes by means of dark or opaque goggles. Seek medical attention IMMEDIATELY.

SKIN CONTACT. Don respiratory protection mask and gloves; remove victims from source immediately and remove contaminated clothing. IMMEDIATELY decon affected areas, flushing with 5 percent solution of sodium hypochlorite or liquid household bleach. After 3-4 minutes, wash off with soap and water to remove decon agent and protect against erythema. Seek medical attention IMMEDIATELY.

INGESTION. Do not induce vomiting. Give victim milk to drink. Seek medical attention IMMEDIATELY.

SECTION VI - REACTIVITY DATA

STABILITY: Stable at ambient temperatures. Decomposition temperature is 149 DEG C to 177 DEG C. Mustard is a persistent agent depending on pH and moisture, and has been known to remain active for up to three years in soil.

INCOMPATIBILITY: Conditions to avoid. Rapidly corrosive to brass @ 65 DEG C. Will corrode steel at a rate of .0001" of steel per month @ 65 DEG C.

HAZARDOUS DECOMPOSITION: Mustard will hydrolyze to form HCl and thiodiglycol.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VII - SPILL, LEAK, AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Only personnel in full protective clothing will be allowed in an area where mustard is spilled. The mustard should be contained using vermiculite, diatomaceous earth, clay or fine sand and neutralized as soon as possible using copious amounts of STB slurry or HTH solution. Never use dry STB or HTH since they will react violently with mustard and may burst into flames. Scoop up all contaminated material and place in approved DOT containers. Pour in STB slurry or HTH solution. Decontaminate the outside of the container, label in accordance with state, DOT and EPA regulations, and hold for disposal.

NOTE: Surfaces contaminated with HD and then rinse-decontaminated may evolve sufficient mustard vapor to produce a physiological response.

WASTE DISPOSAL METHOD: All decontaminated material should be collected, contained and chemically decontaminated or thermally decomposed in an EPA approved incinerator, which will filter or scrub toxic by-products from effluent air before discharge to the atmosphere. Any contaminated protective clothing should be decontaminated using HTH or bleach and analyzed to assure it is free of detectable contamination (3X) level. The clothing should then be sealed in plastic bags inside properly labeled drums and heald for shipment back to the DA issue point. Decontamination of waste or excess material shall be accomplished in accordance with the following procedure:

(a) HD on laboratory glassware may be oxidized by its vigorous reaction with concentrated nitric acid.

(b) Chemical decontamination of HD may be accomplished by adding it to an excess of 60/40 slurry of STB or HTH solid bleach and water. HD has poor solubility in water. The HD-bleach slurry must be stirred frequently over 24 hours to assure that the HD has contacted and reacted with the bleach. After 24 hours, test for the presence of active chlorine in the decon slurry before discarding.

Alternately, decontaminated waste and/or HD can be held for pick-up by a Technical Escort Team.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Concentration mg/m3	Respiratory Protection/Ensemble Required
Less than 0.0003	M9, M17, or M40 series mask shall be available

	NOTE: When HT concentrations are below the detection limit, but qualitative evidence (i.e., garlic odor or damaged container) indicates potential vapor exposure, the mask shall be worn.
0.003 to 0.5	M9 or M40 series mask with Level A or Level B ensemble including impregnated innerwear (see AMCR 385-131 for determination of the appropriate level).
	Demilitarization Protective Ensemble (DPE) (30 mil), used with prior approval from the AMC Field Safety Activity. Use time for the 30 mil DPE must be restricted to two hours or less.
Greater than 0.5 or unknown	DPE (30 mil), used with prior approval from AMC Field Safety Activity. Use time must be restricted to two hours or less.
	NOTE: When 30 mil DPE is not available the M9 or M40 series mask with Level A protective ensemble including impregnated innerwear can be used. However, use time shall be restricted to the extent operationally feasible, and may not exceed one hour.
	As an additional precaution, the cuffs of the sleeves and the legs of the M3 suit shall be taped to the gloves and boots to reduce aspiration.

ENTILATION:

ocal Exhaust. Mandatory. Must be filtered or scrubbed.

pecial. Chemical laboratory hoods shall have an average inward face velocity of 100 linear feet per minute (1 fpm) plus or minus 10% with the elocity at any point not deviating from the average face velocity by more hat 20%. Laboratory hoods shall be located such that cross drafts do not exceed 20% of the inward face velocity. A visual performance test utilizing moke producing devices shall be performed in assessing the ability of the ood to contain agent HD.

Other. Recirculation of exhaust air form agent areas is prohibited. No onnection between agent area and other areas through the ventilation system permitted. Emergency backup power is necessary. Hoods should be tested semi-annually or after modification or maintenance operations. Operations should be performed 20 cm inside hoods.

OTECTIVE GLOVES: MANDATORY. Butyl toxicological agent protective gloves (M3, M4, gloveset).

E PROTECTION: As a minimum, chemical goggles will be worn. For splash azard use goggles and face-shield.

HER PROTECTIVE EQUIPMENT: Full protective clothing will consist of the butyl rubber suit with hood, M2A1 boots, M3 gloves, impregnated nderwear, M9 series mask and coveralls (if desired), or the emilitarization Protective Ensemble (DPE). For general lab work, gloves d lab coat shall be worn with M9 or M17 mask readily available.

n addition, when handling contaminated lab animals, a daily clean smock,

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Voluntary pregnanc testing shall be offered to women who may be exposed to HD above its PEL During handling, the "buddy" (two-man) system will be used. Containers should be periodically inspected for leaks, either visually or using a detector kit, and prior to transfering the containers from storage to work areas. Stringent control over all personnel handling HD must be exercised. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and at the end of the workday. No smoking, eating, or drinking is permitted at the work site. Decontaminationg equipment shall be conveniently located. Exits must be designed to permit rapid evacuation. HD should be stored in containers made of glass for Research Development Test and Evaluation (RDTE) quantities or one-ton steel containers for large quantities. Agent shall be double-contained in liquid-tight containers when in storage.

OTHER PRECAUTIONS: See AMC-R 385-131, "Safety Regulations for Chemical Agents H, HD, HT, GB and VX", 9 Oct 1987, for additional information.

SECTION X - TRANSPORTATION DATA

PROPER SHIPPING NAME: Poisonous liquid, n.o.s.

DOT HAZARD CLASS: Poison A

DOT LABEL: Poison Gas

DOT MARKING: Poisonous liquid, n.o.s. (sulfur mustard) NA 1955

DOT PLACARD: Poison Gas

EMERGENCY ACCIDENT PRECAUTIONS AND PROCEDURES: See Sections IV and VIII.

PRECAUTIONS TO BE TAKEN IN TRANSPORTATION: Motor vehicles will be placared regardless of quantity. Driver shall be given full and complete information regarding shipment and conditions in case of emergency. AR 50-6 deals specifically with the shipment of chemical agents. Shipment of agents will be escorted in accordance with AR 740-32.

ADDENDUM A
ADDITIONAL INFORMATION FOR THICKENED HD

HAZARDOUS INGREDIENTS: None in liquid form. K125 (acryloid copolymer, 5%) is used to thicken HD. K125 is not known to be hazardous except in a finely-divided, powder form.

PHYSICAL DATA: Essentially the same as HD except for viscosity. The viscosity of HV is between 1000 and 1200 centistokes @ 25 DEG C.

FIRE AND EXPLOSION DATA: Same as HD.

HEALTH HAZARD DATA: Same as HD except for skin contact. For skin contact, don respiratory protective mask and remove contaminated clothing IMMEDIATELY. IMMEDIATELY scrape the HV form the skin surface, then wash the contaminated surface with acetone. Seek medical attention IMMEDIATELY.

SPILL, LEAK, AND DISPOSAL PROCEDURES: If spills or leaks of HV occur, follow the same procedures as those for HD, but dissolve the HV in acetone prior to introducing any decontaminating solution. Containment of HV is generally not necessary. Spilled HV can be carefully scraped off the contaminated surface and placed in a fully removable head drum with a high density, polyethylene lining. The HV can then be decontaminated, after it has been dissolved in acetone, using the same procedures used for HD. Contaminated surfaces should be treated with acetone, then decontaminated using the same procedures as those used for HD.

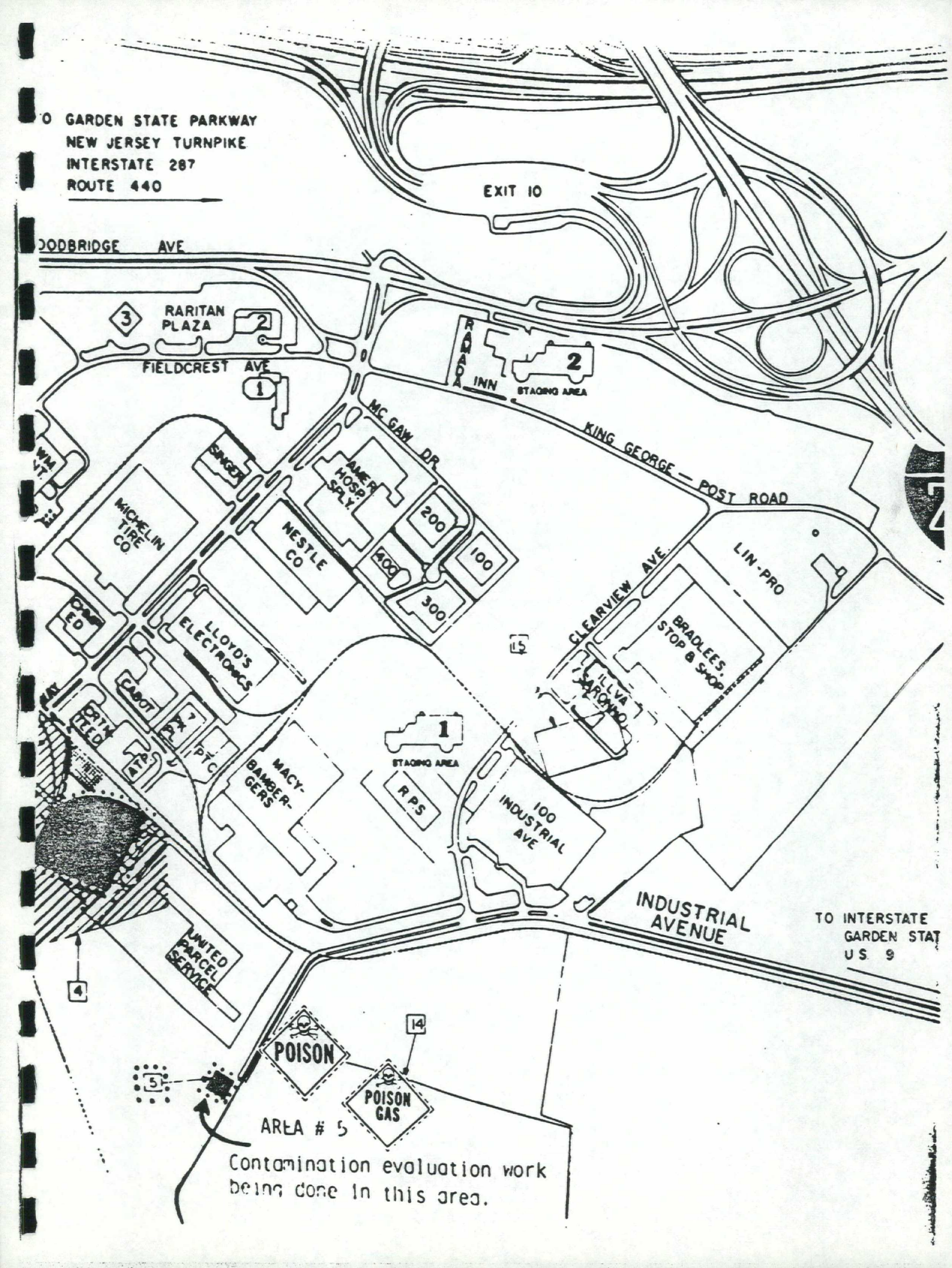
NOTE: Surfaces contaminated with HV or HD and then rins-decontaminated may evolve sufficient mustard vapor to produce a physiological response.

SPECIAL PROTECTION INFORMATION: Same as HD.

SPECIAL PROTECTION INFORMATION: Same as HD

SPECIAL PRECAUTIONS: Same as HD with the following addition. Handling the HV requires careful observation of the "stringers" (elastic, thread-like attachments) formed when the agents are transferred or dispensed. These stringers must be broken cleanly before moving the contaminating device or dispensing device to another location, or unwanted contamination of a working surface will result.

TRANSPORTATION DATA: Same as HD.


O GARDEN STATE PARKWAY
NEW JERSEY TURNPIKE
INTERSTATE 287
ROUTE 440
EXIT 10
ODDBRIDGE AVE
RARITAN PLAZA
FIELDCREST AVE
ROAD A INN
STAGING AREA
MC GAW DR
KING GEORGE — POST ROAD
SANGER
AMER HOSP SPLY
MICHELIN TIRE CO
NESTLE CO
200
400
100
300
CLEARVIEW AVE
LIN-PRO
BRADLEES STOP & SHOP
ILLVA SARONNO
LLOYD'S ELECTRONICS
CABOT
PTC
ATP
MACY-BAMBERGERS
RPS
100 INDUSTRIAL AVE
INDUSTRIAL AVENUE
TO INTERSTATE
GARDEN STAT
US 9
UNITED PARCEL SERVICE
POISON
POISON GAS
AREA # 5
Contamination evaluation work being done in this area.

News Release

US Army Corps of Engineers
Kansas City District
Leaders In Customer Care

700 Federal Building
Kansas City, MO 64106-2896

Phone: (816) 426-5241

CONTACT:
George Hanley

September 9, 1988

RELEASED BY PR NEWS-WIRE FOR RELEASE SEPTEMBER 12 A.M.

cc: SJR
RPC
JRK
JFF

Field work on the U.S. Army Corps of Engineers, Kansas City District study to confirm the presence or absence of toxic or hazardous waste at the former Raritan Arsenal site in Edison, NJ, will begin this week.

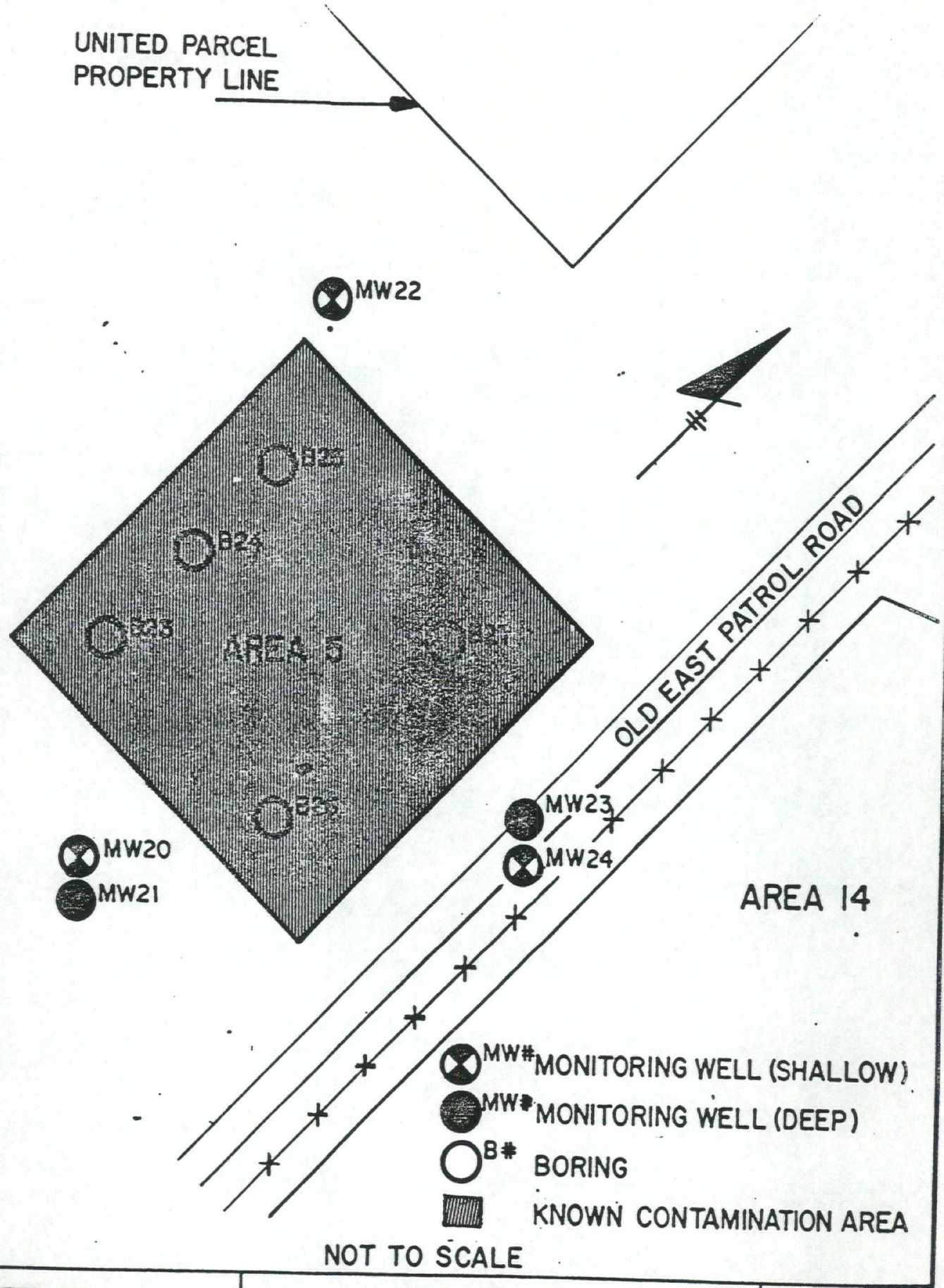
Raritan Arsenal is one of more than 7,100 sites identified under the Defense Environmental Restoration Program - Formerly Used Sites (DERP-FUS). Under DEPP-FUS, each site is surveyed to determine if there is unsafe debris, ordnance and/or hazardous or toxic waste as a result of Department of Defense (DOD) use of the site, and what restoration efforts are necessary.

This program was authorized by Congress in 1983. It is the functional equivalent of Superfund for DOD installations, but is funded through the Department of Defense.

Environmental testing at the former Raritan Arsenal site is scheduled to be completed during the first quarter of 1989. If necessary, the Corps will perform a remedial investigation, which includes public hearings.

This $800,000 study will be conducted by O'Brien and Gere, consulting engineers, of Edison, NJ. A report of the study will be prepared upon completion.

-30-



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O'BRIEN & GERE ENGINEERS, INC.

AREA 5

BORING & WELL LOCATIONS

FILE NO. 3068-005

DATE FEB. 1988

DWG NO FIGURE 4-5

O = possible pit location (gray clay mat'l.)

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AREA 15

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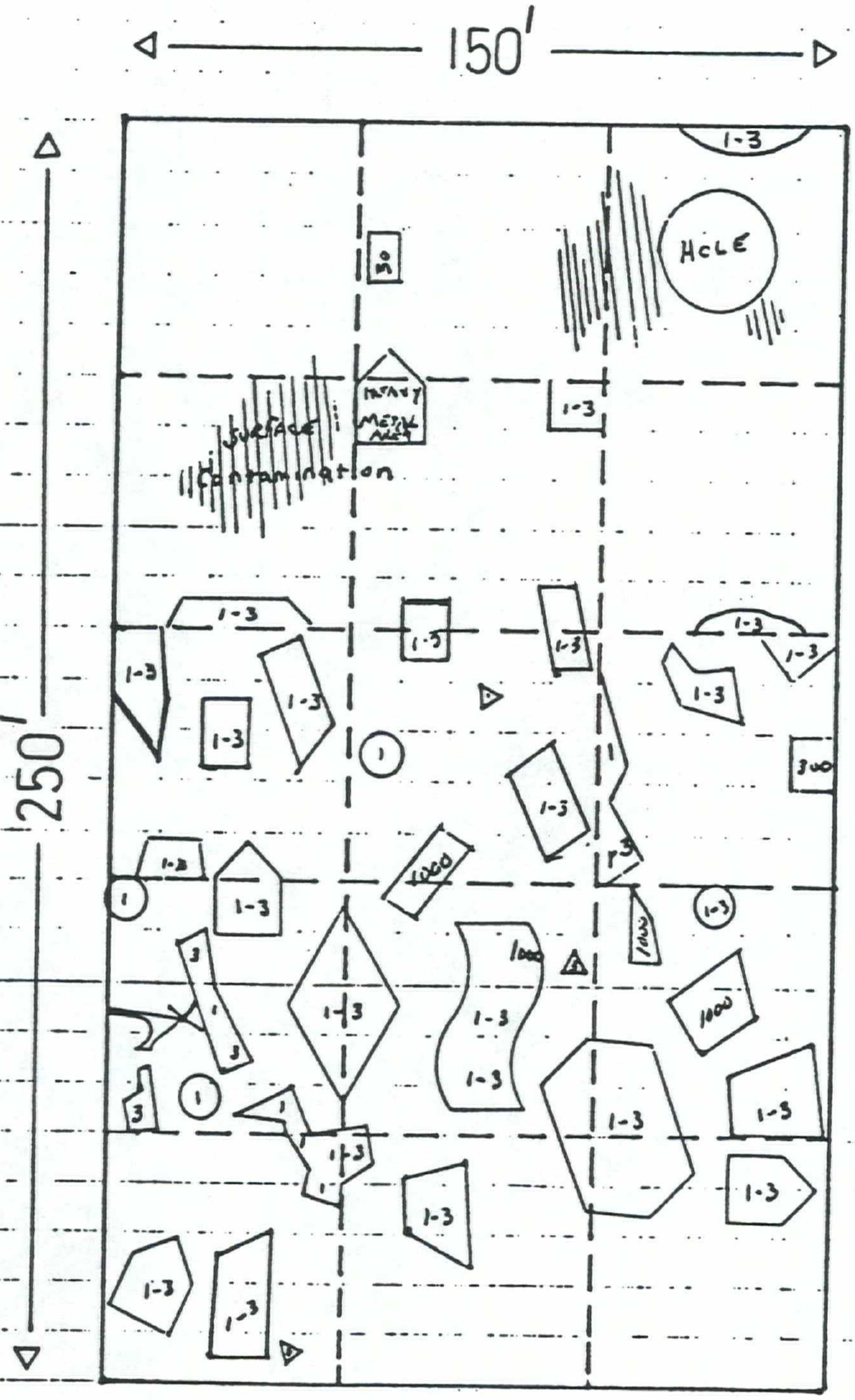

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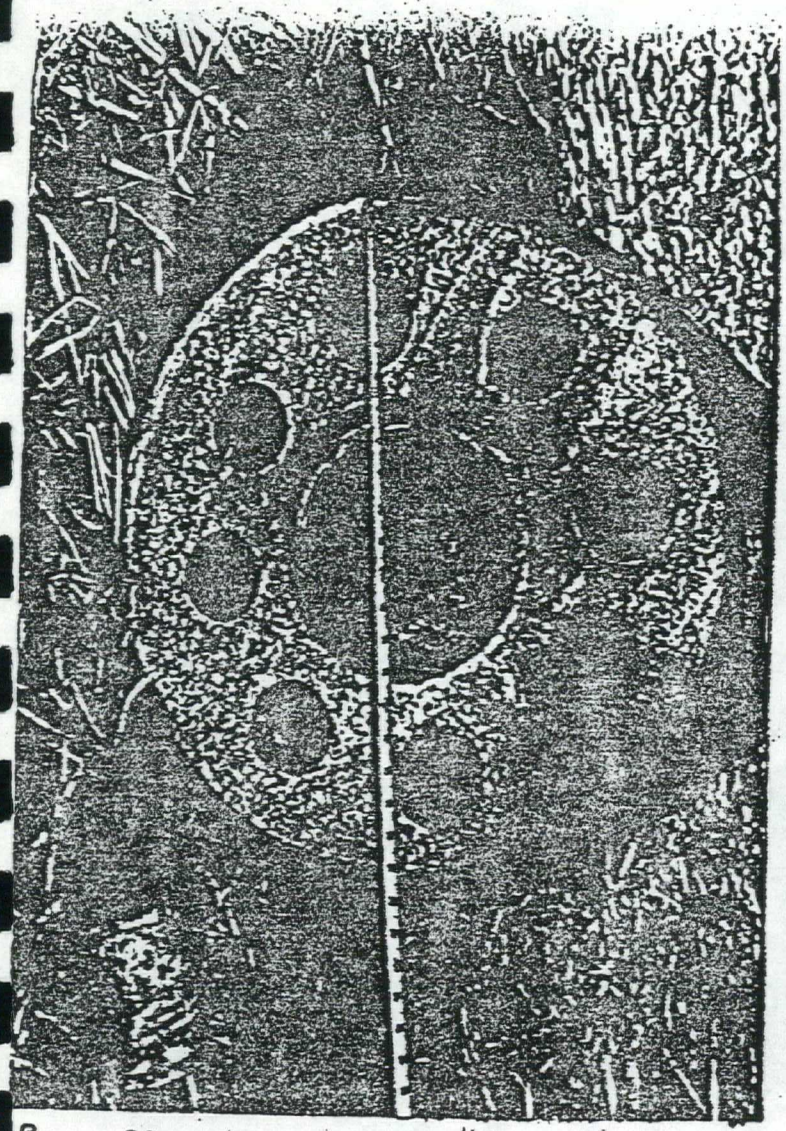

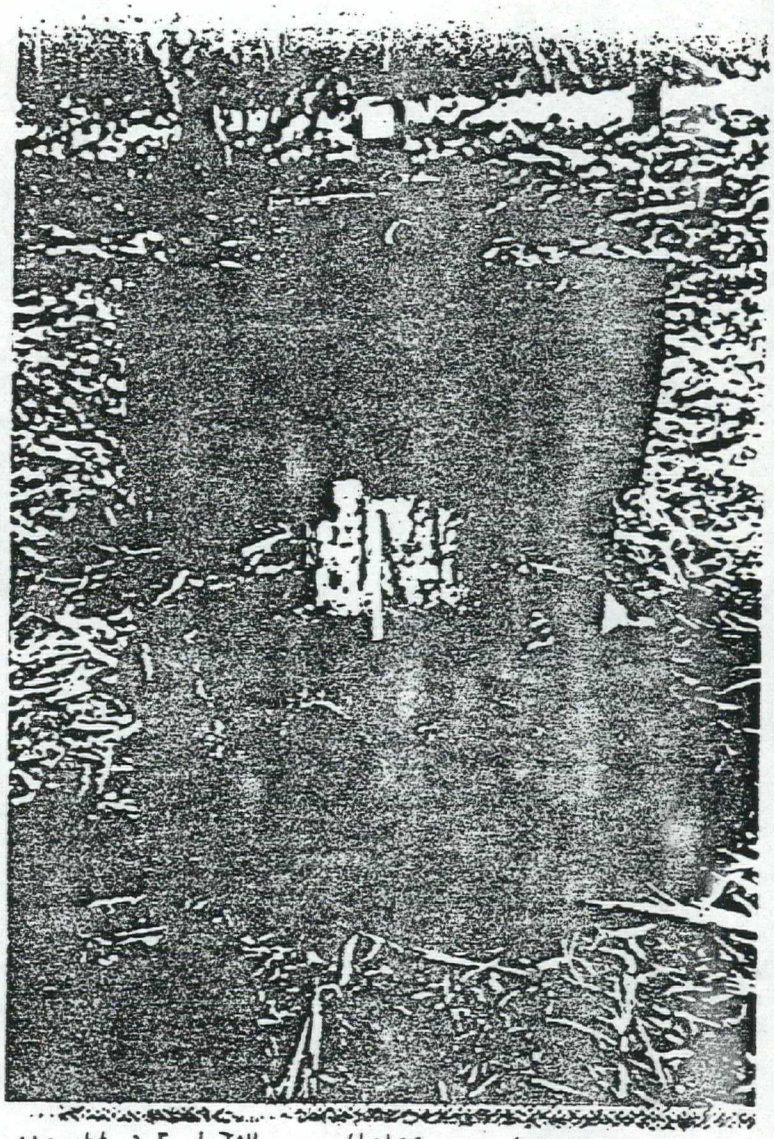

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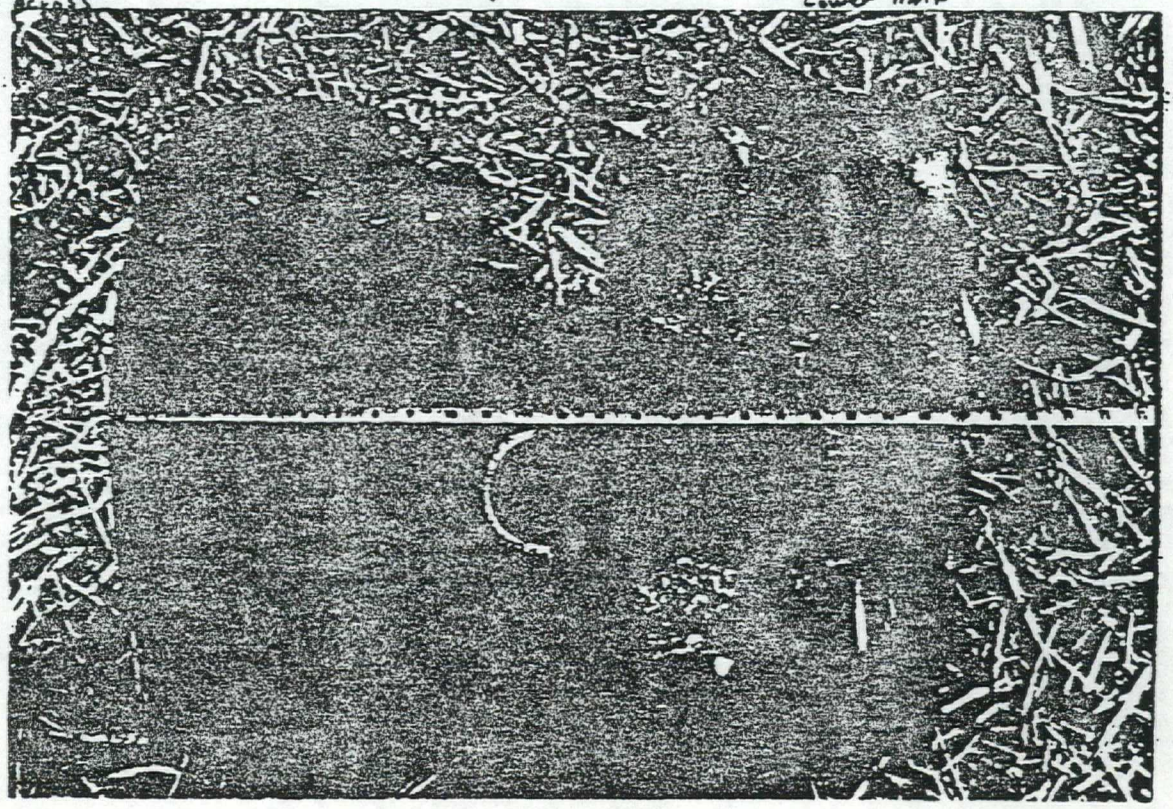

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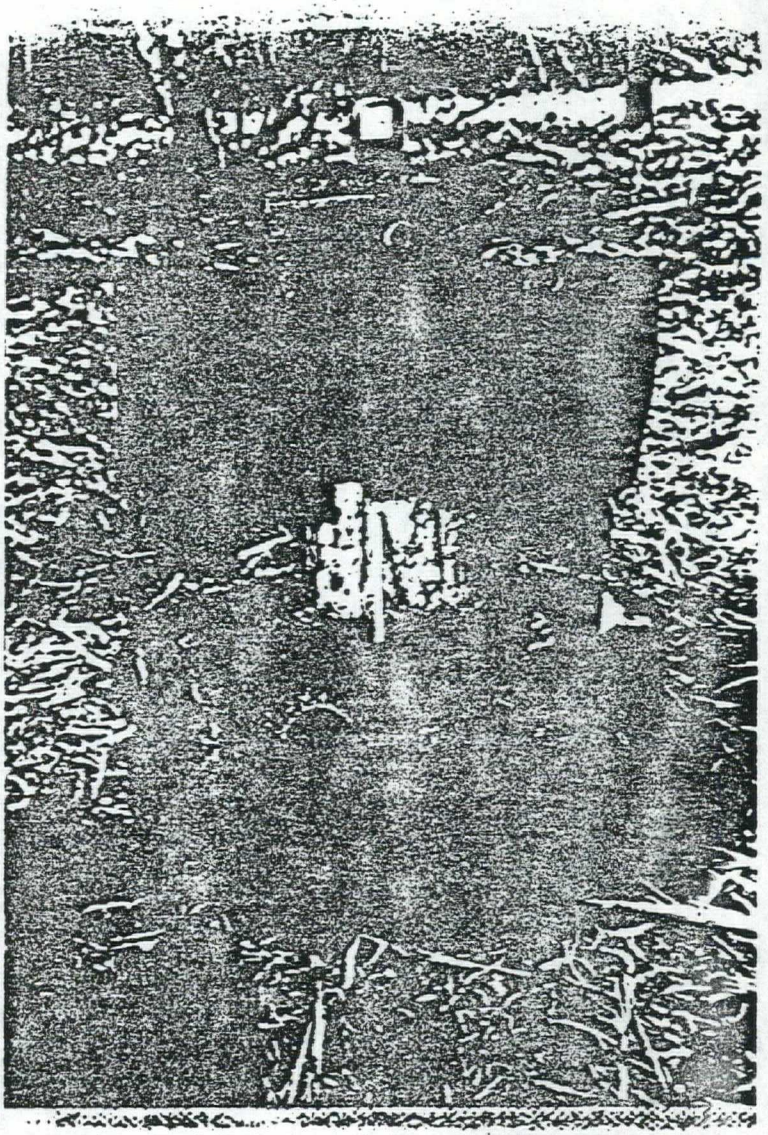

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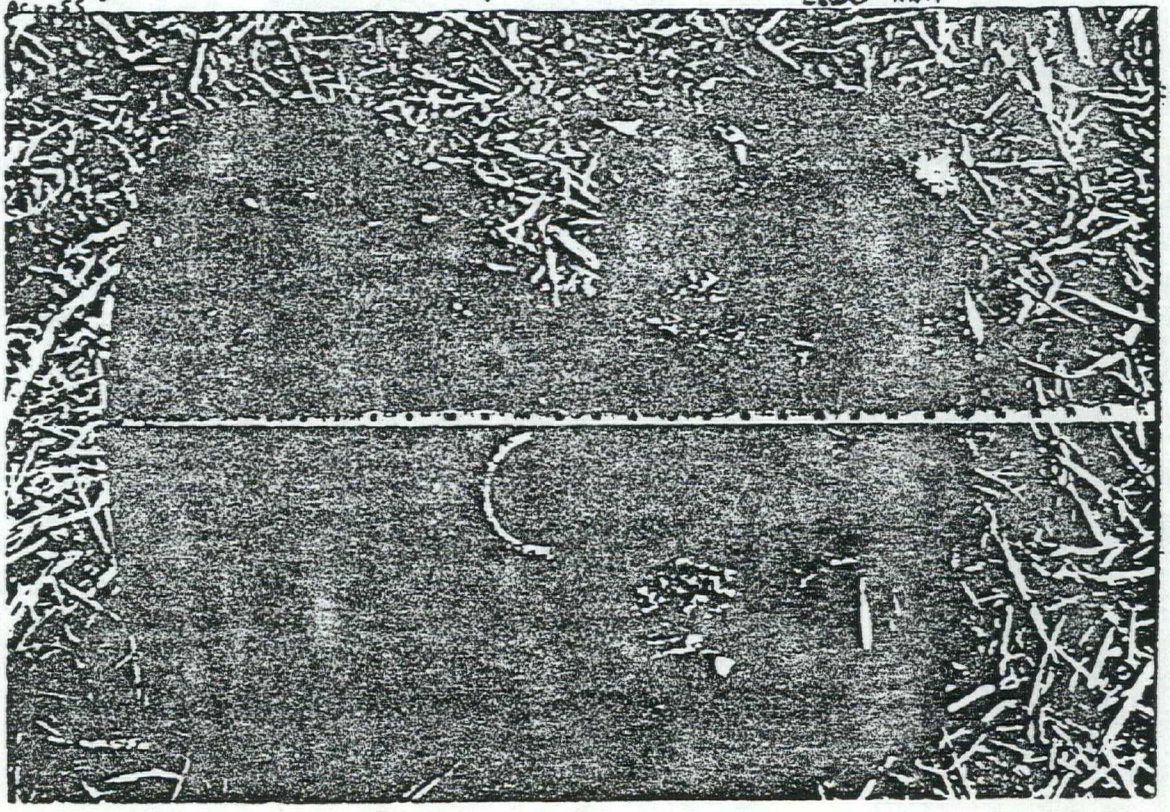

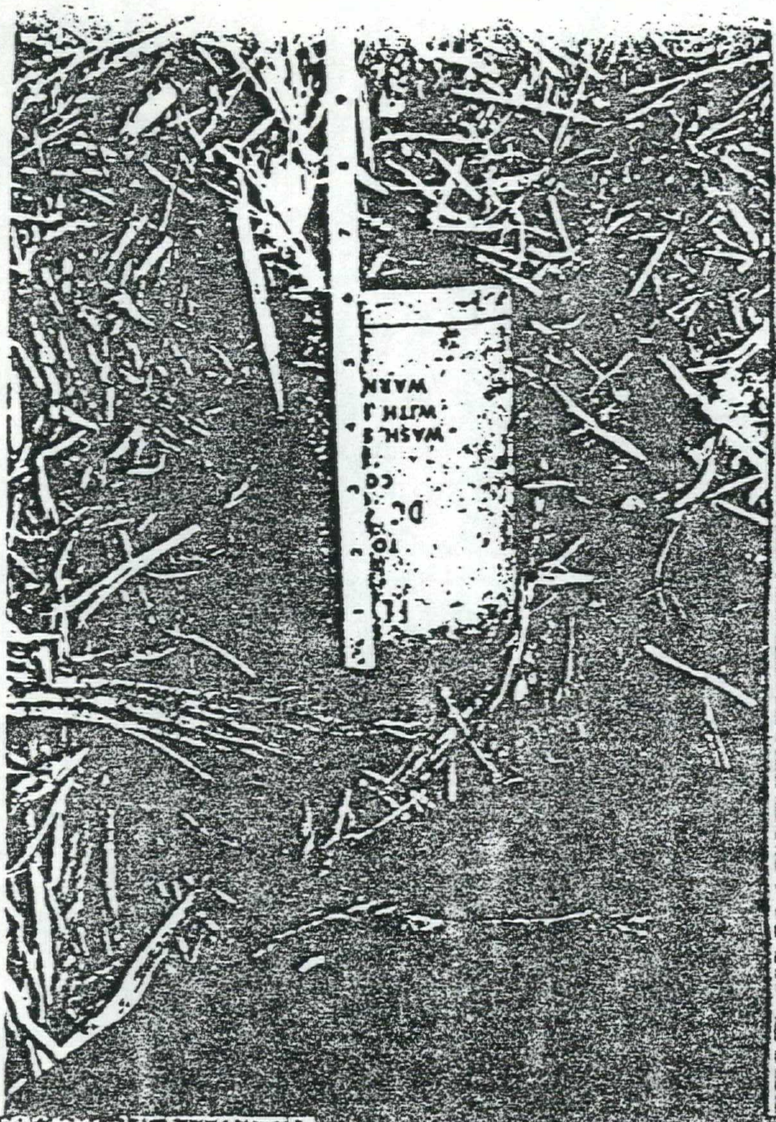

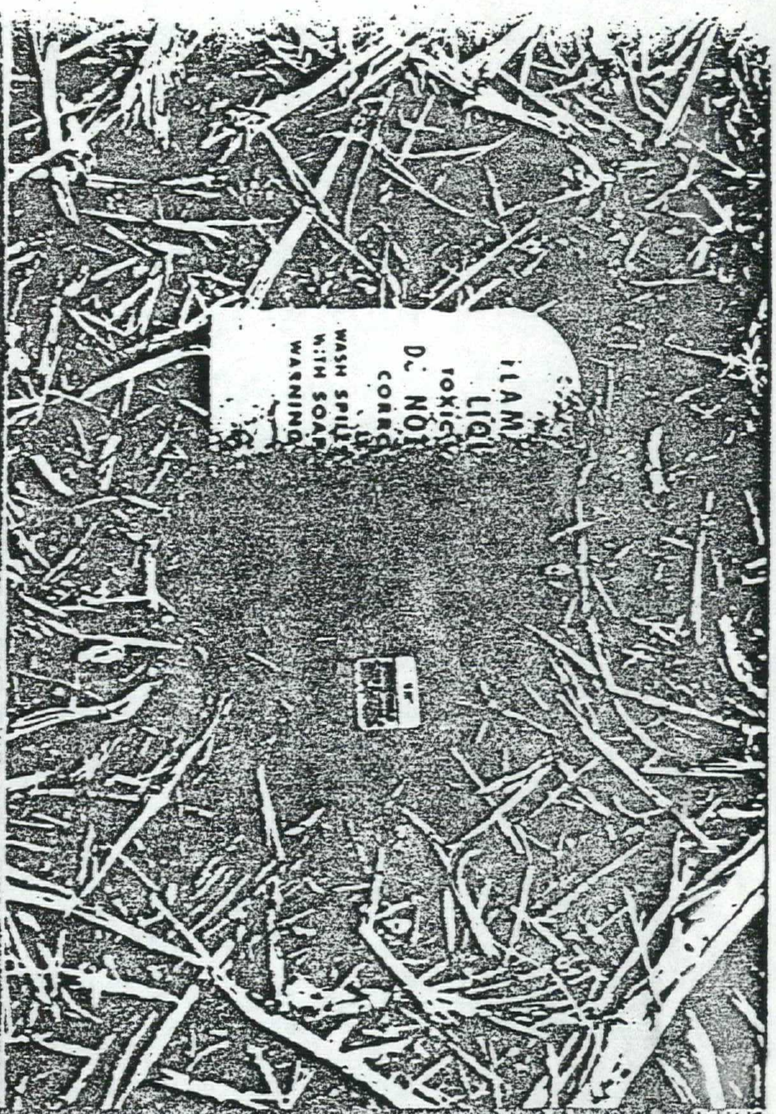

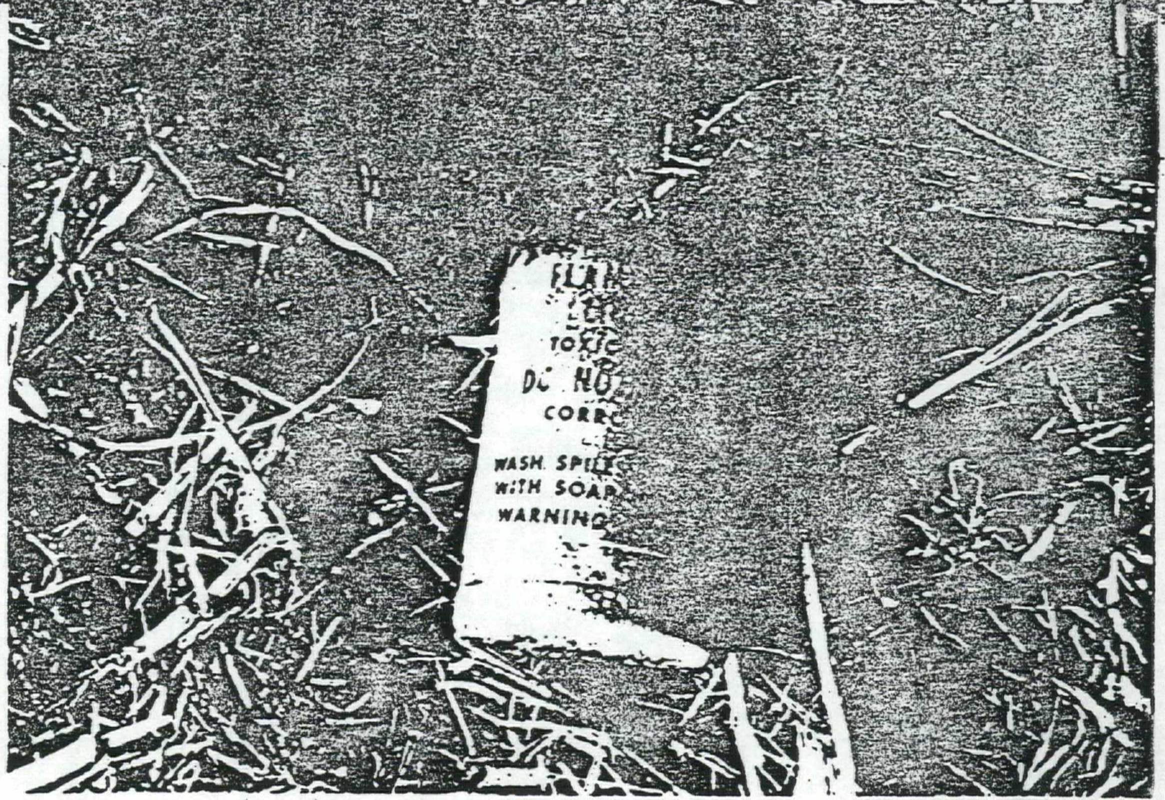
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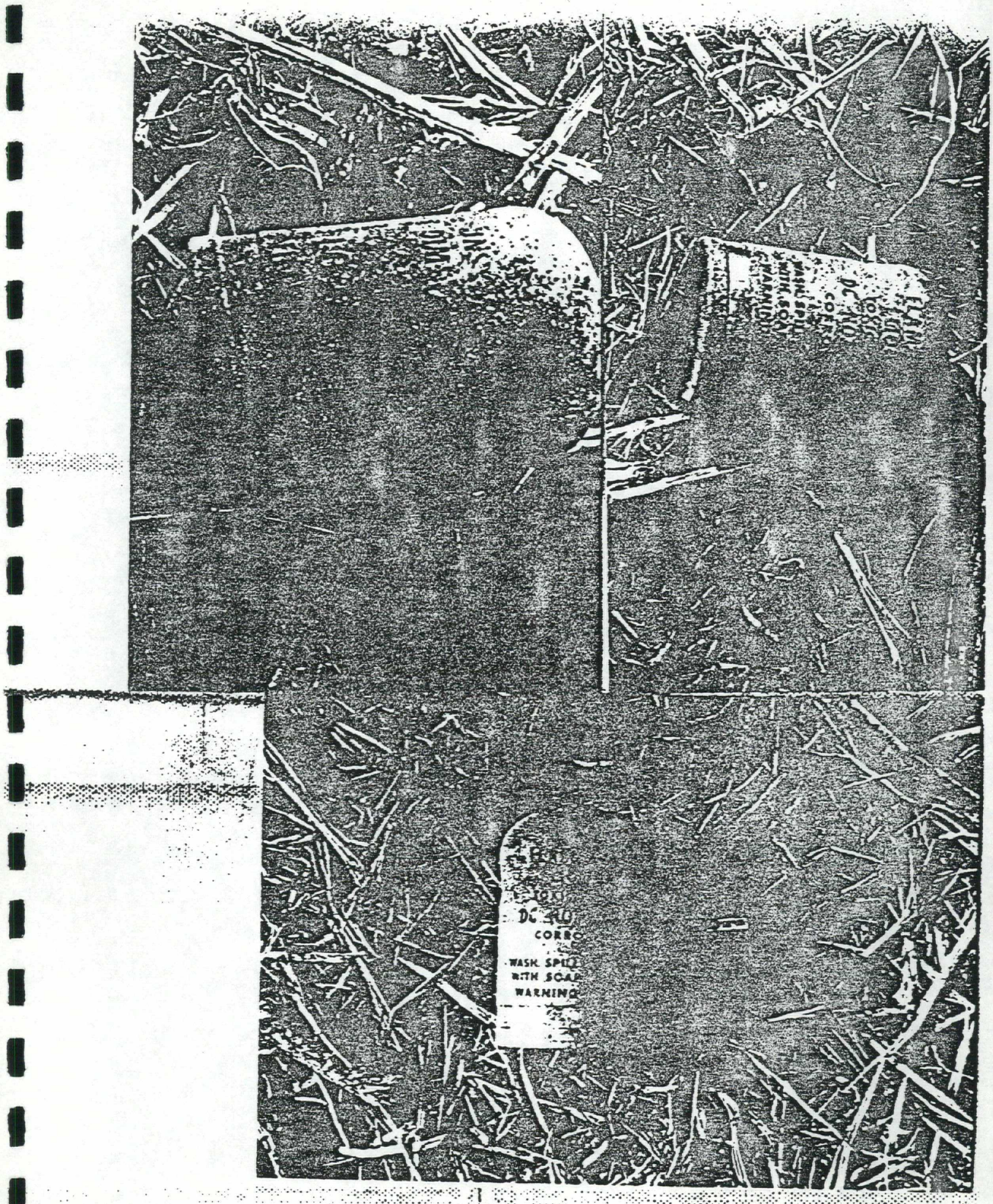
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Rec'd 10/7/88

DEPARTMENT OF THE ARMY
54TH ORDNANCE DETACHMENT (EXPLOSIVE ORDNANCE DISPOSAL)
FORT MONMOUTH, NEW JERSEY 07703

September 23, 1988

O'Brien & Gere
Engineers Inc.

Mr. Joseph A. Valdes, P.E.
Raritan Plaza
Edison, New Jersey 08837

Dear Mr. Valdes:

On 6 September 1988, the 54th Ordnance Detachment (Explosive Ordnance Disposal) conducted a surface clearance of area 4 Raritan Center Industrial Park. Approximately 20 pounds of cast TNT was removed from this site and later destroyed. Hand evacuation at various points below the surface uncovered no other hazardous items. Should any explosive ordnance or material be found in this area following this surface clearance this unit should be contacted immediately.

For Ralph I Lul SFC
Michael J. Davis
Captain, U.S. Army
Commanding

Copies Furnished:

U.S. Army Engineer District Kanas City
ATTN: ED-TD (C. Gunion)
700 Federal Building
Kanas City, MO 64106-2896

Commander, 542nd Ord Det (EOD)
ATTN: CPT Baron
Fort Dix, NJ 08640-6140

Report
of
Surface and Subsurface
Survey Clearance Operations

NEWFIELD ROAD AND FERNWOOD AVENUE AREA
RARITAN CENTER
EDISON, N.J.

MAY 1988

Submitted To:

Summit Associates, Inc.
Garden State Buildings, L.P. Raritan Plaza I
Raritan Center
Edison, N.J. 08817

Submitted By:

UXB International, Inc.
4163 Chain Bridge Road
Fairfax, VA 22030

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4163 Chain Bridge Road
Fairfax, VA 22030

PREFACE

Under contract with Summit Associates, Inc. and Garden State Buildings, L.P. of Raritan Center, UXB International, Inc. (UXB), was tasked to provide explosive ordnance disposal (EOD) services to surface clear and investigate potential subsurface contamination.

Specific requirements and details of UXB's services to Summit are in the UXO Search and Clearance Plan of November 1987 (See Appendix A). This plan, prepared in response to the contract requirements, was approved by Summit for implementation in late November 1987.

This report on surface clearance and subsurface survey of the Newfield area provides summary information and an analysis of the surface clearance and subsurface survey operations conducted by UXB during early December 1987. The report is organized into five chapters, which are briefly described below:

- Chapter 1 - Background - provides general background information on the Newfield area site.
- Chapter 2 - Technical Approach and Procedures - Summarizes the technical approach and approved procedures used by UXB on the project site to facilitate general understanding without referral to the plan.
- Chapter 3 - Summary of operations completed - Provides summary information on the surface clearance and subsurface survey operations completed.
- Chapter 4 - Risk Assessment - An assessment of the ordnance risk remaining on the project site is presented.

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1.0 Survey of Findings and Certification

While nineteen ordnance related items were found in the investigation, none were hazardous items.

This report serves as certification that UXB has completed a surface clearance of the entire project area, and subsurface surveyed the area. Although it is not possible to certify that all risk of an explosive hazard has been removed from the site, it is our expert opinion that construction activity planned for this site can proceed unimpeded with an extremely low risk of incident.

1.1 Background

The land subject to this surface clearance and subsurface survey is part of the land's and structures at Raritan Center, site of the old Raritan Arsenal, which is located approximately 2 miles south of Metuchen, N.J. The parcel of land covered by this project is defined as area 9 part 2 of Raritan Center, Middlesex County, N.J. Contaminated Areas drawing No D418 dated 16 October 1963 (U.S. Department of the Army, Ordnance Corps, Office of Arsenal Facilities Division) (See Appendix B).

The Corps of Engineers decontaminated this area in 1963 by a surface area search and by utilizing a mine detector by EOD personnel. Projectiles found in this area were removed, surface searched, and all munitions and components removed. The subsequent report recommended that the area designated as Area 9, part 2 be released but restricted to surface use only, as this area was suspected of being contaminated with live ammunition and the search (as conducted at that time) could not be completed as the mine detector used could

only indicate the presence of metal to a depth of 18". It was suggested in the report that it may be possible that ammunition could be buried in this area at a greater depth than the mine detector was capable of surveying.

1.2 Project Area Locations

The approximately 6 acre project area defined as Area 9 Part II is located at the Southeast corner of Newfield Avenue and Fernwood Avenue. Map D418, (See Appendix B) shows the approximate location. The area is presently used as a vehicle parking lot, but is mainly an open flat grass area with less than 2 acres of scrub and trees bordering Newfield Avenue.

1.3 Project Area Definition

It is intended subject to the results of this clearance exercise to determine if the current recommended restriction for surface use only can be re-evaluated and allow the construction of a building for commercial or light industrial use consistent with other developments being carried out in adjoining areas.

1.4 Ordnance Related Problems

A former magazine designated H-65 on the Area 9 site was destroyed following the explosion of French Naval Ammunition, 9 November, 1943. The types and range of munitions dispensed by the explosion into the area is not documented in detail but the area was contaminated with a variety of ordnance and smokeless powder.

1.5 Prior Clearance/Survey Operations

Corps of Engineers carried out a decontamination program in 1963. This resulted in Area 9, Part 2 being cleared and a sweep performed with a mine detector. The resultant report indicated the possibility of live munitions

being buried beyond the detection capabilities of the mine detector. Therefore, Part 2 was recommended by LEAD to COE for surface use only. The area was transmitted to Federal Storage Warehouses by deed in 1965. The deed stated that part 2 was recommended for surface use only. The remainder of Area 9 carried no restrictions.

1.6 Summit Associates Requirement for Ordnance Investigation

In order to eliminate the recommended land use restrictions, Summit Associates required the area to be surface searched and undergo subsurface visual, acoustic and electromagnetic inspections in the project area. Another requirement was to identify and remove any ordnance contamination located and establish that the area could be claimed as being entirely safe for general use in relation to the construction of a commercial/industrial building. This requirement would be satisfied by UXB's program work as defined in the UXO Search and Clearance Plan.

2.0 Technical Approach and Procedures

The overall technical approach to the project area was to concurrently conduct surface clearance and subsurface survey operations. Conduct interim analysis of data obtained from these operations on-site and ascertain the requirement for additional subsurface area survey and clearance based on this analysis. The specific operational procedures used by UXB for the surface ordnance clearance and subsurface survey operations performed are summarized in the following paragraphs.

2.1 Surface Clearance

Using the Summit development plan and a visual inspection of the area as a basis, the project area was divided into 60 12 foot wide grids across the site

in the general North/South direction as shown in Figure 2.1. This allowed the 6 foot wide electromagnetic scan to cover the grid lines as laid. The surface search/clearance team, consisting of 2 EOD technicians and one ordnance technician, systematically searched each grid and removed all surface ordnance items located. The search team was equipped with metal detectors to aid in locating surface contamination in these grids. This contamination included both ordnance and non-ordnance related items.

2.2 Subsurface Survey

The subsurface survey was conducted concurrently with the surface clearances by a trained EOD technician using a MK 26 (Foerster) electromagnetic ordnance locator and one Ordnance Technician using a White "Eagle" low frequency acoustic metal locator system. The MK 26 locator will detect ferrous contact; only the White "Eagle" will locate non-ferrous contacts and is programmable. However, the primary detection equipment used for subsurface survey and clearance as necessary was the MK 26 ordnance locator. This equipment is the primary subsurface ordnance locator used by the U.S. Navy EOD forces and has gained widespread acceptance as the standard for this type of operation. The Mk 26 is a hand held unit and uses two fluxgate magnetometers, aligned and mounted a fixed distance apart, to detect changes in the earth's ambient magnetic field caused by ferrous metal or disturbances caused by soil conditions. Both an audio and metered signal are provided to the operator. The metered signal indicates whether the disturbance is geodetic or metal-related. The detection capability of the MK 26 is dependent on the size of the item versus its depth and on the experience of the operator. In general terms, the MK 26 will easily detect a 60mm projectile to a depth of 2 feet and 155mm projectile to 7 feet. The equipment is rated to have a .95 probability of detection in a single sweep over an area.

As the survey progressed and data was collected, efforts were made to determine if a pattern or "footprint" of ordnance related items could be identified.

2.3 Disposition of Material

All ordnance related material found during the surface clearance and subsurface survey/clearance was passed over to the EOD detachment, Fort Monmouth. All other debris was placed in plastic bags and deposited in a dumpster supplied by Summit Associates.

2.4 Data Collection

Data from each grid was recorded on the site map, marking ordnance related items and the type of ordnance found.

3.0 Summary of Operations Completed

The following paragraphs provide a summary of the surface and subsurface clearance/survey operations completed during the period 29 November 1987 through 15 December 1987.

Following the initial visit to the project site a briefing was held with UXB personnel, Summit Associates, and the Edison Police Department. An outline of the objectives was discussed and agreed procedures with the Edison P.D. were established in relation to the disposal of any ordnance found. Present at the briefing were:

Captain Joseph N. Shirley, Sr.	Edison Police Department
Richard A. Latham	Edison Fire Department
John Gycin	Edison Health Department
Ed Kalafsky	Summit Associates
J.W. Sharp	UXB International, Inc.
Ed Stone	UXB International, Inc.

Contact was made with Sgt. Schwartz of Fort Monmouth EOD Detachment for subsequent disposal of ordnance related items found. Note: No hazardous ordnance items were located during the clearance program. All ordnance related items found are identified in Figure 3.1.

3.1 Surface Clearance Operations

The surface sweep was initiated at the commencement of operations from the corner of Newfield Avenue and Fernwood Avenue. Twelve foot wide grid lines were then laid parallel to Fernwood Avenue (Ref. Figure 3.1). Ordnance related items were marked on the site drawing.

3.1.1 Observed Contamination Levels

Ordnance related contamination found in the project area is defined as any man-made metallic or non-metallic item, regardless of size, that is or could be perceived by the public to be of military or explosive origin. The contamination is further classified as either potentially hazardous or non-hazardous. Definitions of these classifications are provided below:

- Potentially Hazardous - Any item that, in the opinion of the EOD trained Project Leader, does or could possibly contain explosive or hazardous material.
- Non-Hazardous - Ordnance or explosive related items/material that contain no explosive material, e.g., expended shell casings, explosive fragments and ammunition clips.

No surface contamination of ordnance related items of any significance was found (small pieces of shrapnel only).

3.2 Subsurface Survey Operations

Subsurface survey operations were conducted concurrently with the surface clearance along the surface grid lines laid down. The total area was covered using electromagnetic locators (MK26) and the White low frequency acoustic locators (non-ferrous search). All contacts were investigated with the exception of targets below the paved parking lot areas. By assessing the other targets that were excavated and realizing that the targets below the pavement would not be disturbed, it was felt that no risk would be taken in not investigating targets below paved areas. Data was reviewed to see if a "footprint" could be established emanating from where the magazine on the site had exploded outward towards Newfield Ave; contamination did not indicate such a characteristic. On completion of the subsurface survey, all holes were filled, grid lines (twine) and stakes removed. A back hoe was used to level mounds of earth close to the junction of Newfield Avenue and Fernwood Avenue and double checked for any ordnance using locators. Non-hazardous ordnance related items were found and identified in Figure 3.1.

4.0 Risk Assessment

As previously stated, the single pass effectiveness of the MK 26 ordnance locator is listed as 95%. In other words, there is a 0.95 probability that all subsurface ferrous metallic objects will be detected to a reasonable depth in a single pass using this equipment. The only area which appears not to have been filled with top soil/fill dirt is the wooded area (Ref. Figure 3.1) Ten ordnance related items found between 18" and 20" (non-hazardous). The fill dirt depth is approximately 24 to 30 inches deep.

In the area of the proposed building subsequent to the survey described herein, the land was excavated for an additional 5 feet and no hazardous ordnance materials were discovered. The fill from the excavation was removed from the site and replaced with off site, non-hazardous fill. The balance of the site will be paved and/or seeded and subjected to surface use only. We therefore recommend that the restrictions be removed from Part 2.

Table I

Ordnance Related Items Found (Subsurface)

Item	Ordnance Type	Number of Hazardous	Number of Non-Hazardous	Grid Ref#
1	37 mm Projectile	0	2	9, 12
2	4" Dia. Cartridge Base	0	1	35
3	4" Dia Cartridge Base	0	1	34
4	3" Projectile w/fuse (empty)	0	4	10, 11, 37
5	3" Dia. Base Fuse	0	2	23, 24
6	81 mm Mortar 12" long with Fuse	0	1	28
7	30 Caliber Projectile	0	2	25, 30
8	30 Caliber Case	0	1	10
9	30 Caliber Round	0	2	26, 32
10	30 Caliber Round	0	1	13
11	50 Caliber Projectile	0	1	10
12	308 Caliber Case	0	1	30
	TOTAL NUMBER	0	19	

APPENDIX A

DRAFT

Submitted To:

Summit Associates, Inc.
Garden State Building, Raritan Plaza II
Raritan Center
Edison, N.J. 08817

UXO SEARCH AND CLEARANCE PLAN

NEWFIELD AREA

NOVEMBER 1987

Submitted By:

UXB International, Inc.
4163 Chain Bridge Road
Fairfax, VA 22030

DRAFT

PREFACE

Summit Associates, Inc., Edison, New Jersey, requires a six acre site at the intersection of Newfield and Fernwald Avenues, Raritan Center, Edison, N.J. to be cleared of unexploded ordnance (UXO) both on the surface and subsurface to a depth of _____ inches.

Based on UXB International Inc.'s extensive experience in Explosive Ordnance Disposal (EOD) and participation in formerly used military range clearance and survey projects, UXB has been chosen to conduct the ordnance clearance of the six acre site.

This plan, developed by UXB, outlines the methods for completing the surface search and electromagnetic subsurface search and clearance of any located ordnance from the six acre area. The plan is divided into 3 sections, which are briefly described below:

- Section One - Management Organization and General Technical Approach
  The on-site management organization for the clearance and support operations is presented, including discussion of the general technical approach to the Summit, Inc. tasking. Also included are the facilities and equipment to be used.

o Section Two - Operational Procedure

This section provides specific procedures to be used in the clearance of the 6 acre site.

o Section Three - Reports

This section discusses the reports that will be provide to Summit, Inc. documenting the work accomplished.

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SECTION I - MANAGEMENT ORGANIZATION AND GENERAL TECHNICAL APPROACH

SECTION II - OPERATIONAL PROCEDURES

SECTION III - REPORTS

SECTION I

MANAGEMENT ORGANIZATION AND GENERAL TECHNICAL APPROACH

1.0 INTRODUCTION

The UXB team has extensive experience with EOD and Ordnance Clearance. In addition, based on our many years of experience as Explosive Ordnance Disposal Specialists, many of our personnel are well equipped to deal with the unique challenge of locating UXO. This section provides information on the general management and technical approach that will be implemented to complete the ordnance clearance project. The tentative schedule of operations, logistic requirements and standard and emergency action procedures are also discussed. Detailed procedures on the actual search and clearance operations are contained in Section 2.0.

1.1 MANAGEMENT ORGANIZATION

Figure 1-1 shows the management organization that will be used to ensure that all operations are carried out correctly, safely and effectively. The responsibilities and authority of the key management and operational personnel identified are discussed in subsections that follow.

1.1.1 Key Management Personnel

The key upper level management personnel shown in Figure 1-1 is the UXB Program Manager. The general responsibility he has is defined below:

o UXB Program Manager - J. Boyden.

Responsible for overall program management and coordination, contract

administration, and contract application of necessary resources to ensure project completion.

1.1.2 Key Operational/Safety Personnel

All on-site operations requiring UXB personnel, material, or machines and all authorized visitors will be under direct supervision and control while on site. Because of the extensive EOD training and experience of UXB personnel, the on-site ordnance safety program will be directed and administered by UXB. The key UXB personnel, identified in figure 1-1 under the overall supervision of the UXB Program Manager, will be responsible for on-site operations and safety.

All key UXB personnel have been fully EOD-trained at the U.S. Naval School EOD, and have extensive experience in military EOD range clearance operations. Collectively and individually, these personnel have the responsibility and authority to correct problems, stop work, or take appropriate action to prevent accidents (explosive or industrial) whenever an unsafe condition is observed or forseen. All personnel are familiar with the U.S. Military 60-series EOD publications, identification guides, and associated safety publications.

The specific responsibilities and authority of these personnel are defined below:

- UXB Project Leader/Safety Officer - E. Stone - Reporting to the UXB Program Manager, the Project Leader is responsible

for the direction and coordination of all daily operations, including the assignment and supervision of required personnel to search/clearance teams. He will ensure that the search/clearance teams are complying with Search and Excavation SOP's, including recording required data.

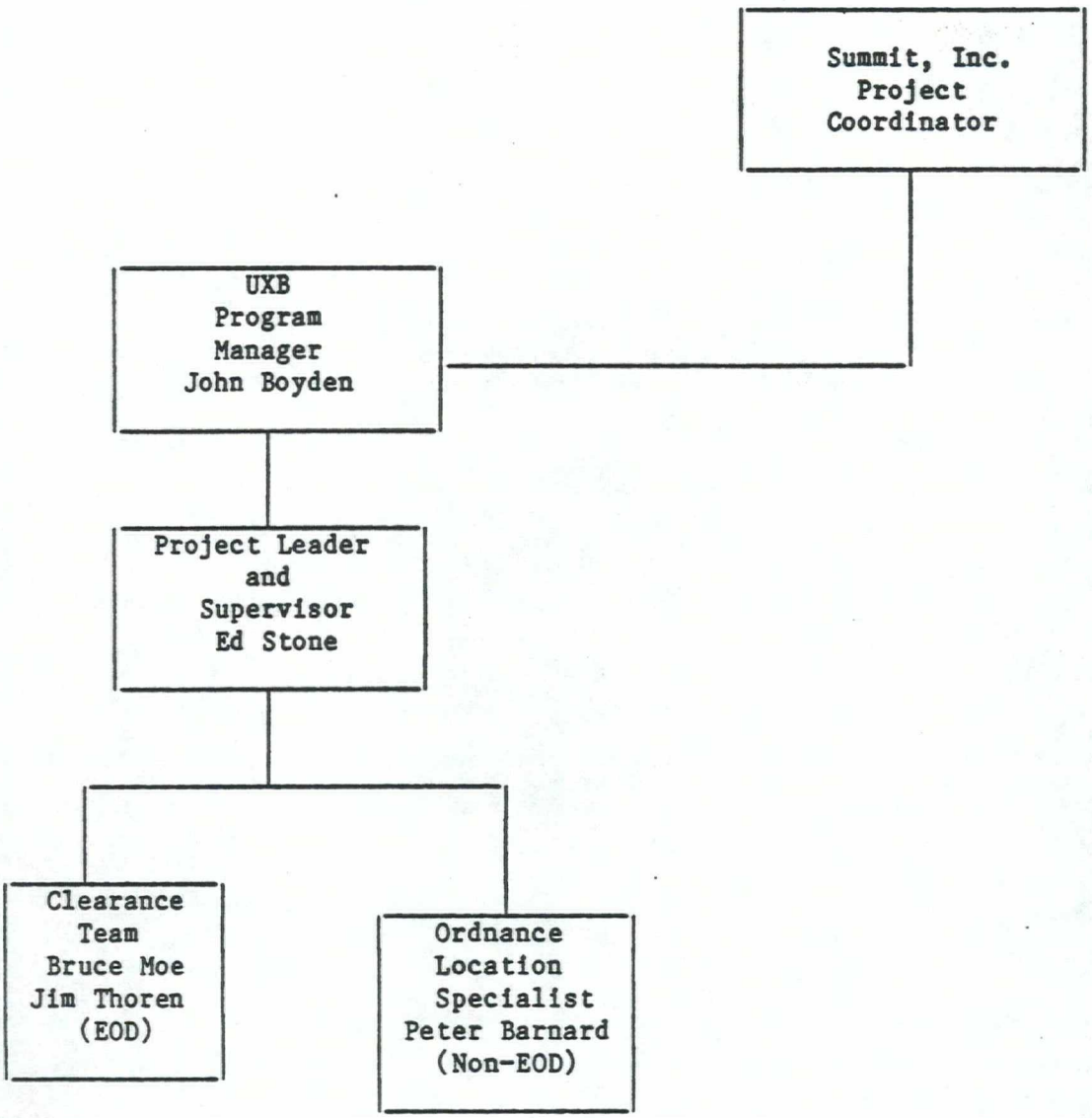

Figure 1-1 UXO Search and Clearance Management Organization

In an emergency, the Project Leader acts as the on-site coordinator, responsible for directing initial action until the arrival of local emergency response teams. Also acting as the on-site ordnance Safety Officer, the UXB Project Leader is responsible for the implementation and day-to-day adminstration of safety procedures and for coordinating and conducting all general, procedural, and safety training specified herein. He will control all matters pertaining to safety during on-site search/clearance excavation, handling and disposal of ordnance, and any other activities requiring UXB personnel or equipment on site. Commensurate with this responsibility, he has the authority to stop all on-site activity when an unsafe condition develops and to prevent admittance to the site of unauthorized personnel when operations are in progress. He acts as the primary point of contact for all federal, state and local personnel. In the event of an accident or other emergency situation, he will coordinate all on-site emergency operations and direct the implementation of emergency procedures, including notifying local authorities and submitting required reports. In addition, he will ensure the performance of weekly equipment maintenance checks, update required maintenance and training records, conduct periodic safety inspections of personnel and equipment, and periodically observe survey operations.

- UXB EOD/Specialists - Reporting to the UXB Project Leader/Safety Officer Supervisor, the EOD trained specialists are directly responsible for all personnel assigned to their respective teams. They will assist the Project Leader/Safety Officer in the conduct of training.

They will also inspect and observe, on a daily basis, all personnel and operations under their supervision to ensure adherence to procedures, compliance with safety requirements, and the well-being of their team members. In the event of an emergency in their area, they will initiate immediate emergency procedures until relieved by the Project Leader/Safety Officer.

1.2 GENERAL TECHNICAL APPROACH

Based on the experience UXB has gained during previous Ordnance Clearance projects both for the U.S. Army Corps of Engineers and private industry, UXB will conduct this project utilizing a Five Task approach. These tasks will be discussed in the following paragraphs.

1.2.1 Record Review (Task 1)

Using the data, records, and points of contact provided by Summit Associates, UXB will conduct a records search of appropriate files. All available information on the use of the project site will be collected. The information will be evaluated and combined with the actual clearance data obtained on site to generate as complete a picture as possible of the levels, types, and boundaries of ordnance-related contamination in and adjacent to the project site.

1.2.2 Work Plan (Task 2)

This draft Work Plan is submitted for review and comments. Based on Summit Associates, Inc. review and comments, a final Work Plan will be submitted.

1.2.3 Surface Ordnance Clearance (Task 3)

A surface visual sweep team, consisting of two EOD trained specialists and two to four laborers, will conduct a visual search of the project site. Unexploded ordnance items and ordnance debris will be collected. Unexploded ordnance that can be safely moved will be placed at a designated ordnance holding area.

1.2.4 Subsurface Ordnance Clearance (Task 4)

A subsurface ordnance clearance team, consisting of an EOD trained supervisor, a geophysical specialist and a laborer will conduct a subsurface electromagnetic search of the entire six acre site. The Foerster Electromagnetic Detector (MK 26 Ordnance Locator) will be used for the subsurface survey. The MK 26 is the most recent military approved locator and is in use by the U.S. Military EOD forces for detecting subsurface ordnance items. The locator is a hand-held unit and uses 2 fluxgate magnetometers, aligned and mounted a fixed distance apart to detect changes in the earth's ambient magnetic field caused by ferrous metal or disturbances caused by soil conditions. Both an audio and metered signal are provided to the operator. The metered signal indicates whether the disturbance is geodetic or metal-related. The detection capability of the MK 26 is dependent on the size of the item versus its depth and on the experience of the operator. In general terms, the MK 26 will easily detect a 60 mm projectile to a depth of 2 feet and a 155 mm projectile to 7 feet.

The geophysical specialist will use the MK 26 and search along one side of the grid line for subsurface contamination. When a contact is found, the laborer will check with his hand to determine if the contact is on or just below the surface. If the contact is buried, the ordnance locator operator will continue to test the spot with the locator until the laborer is able to dig up the contact. All excavations will be accomplished by hand or with hand tools and in accordance with standard EOD procedures. An EOD technician will be present to ensure safety and to verify all excavations. The items will then be recorded on the survey grid data sheets.

1.2.5 Reports (Task 5)

Weekly status reports will be provided to the Summit and UXB Program Managers. A final report with the results of the clearance will be provided to Summit Associates, 30 days after on site operations are completed.

1.3 SCHEDULE OF OPERATIONS

The overall schedule for UXB support to the Summit Newfield clearance Facility project is broken down into three phases, which are discussed in the following subsections:

1.3.1 Mobilization (Phase I)

This phase covers the period 16 November 1987 through 1 December 1987 and includes all preliminary planning, marshalling the necessary personnel on site,

and training of personnel. The specific actions and associated dates are listed below:

- o Plan Development, Review, and Approval - 16 November - 27 November 1987
- o On-Site Mobilization and Training, 30 November - 1 December 1987

1.3.2 Site Operations (Phase II)

Phase II will commence immediately upon completion of Phase I and continue for a minimum of 2 weeks. If extensive subsurface excavations are required, additional weeks of effort will be required.

1.3.3 Demobilization (Phase III)

This phase will start upon completion of Phase II and will take 2-3 days to remove all UXB personnel and equipment from the site. Thirty days after commencement of Phase III, UXB will submit a Clearance Report of UXB clearance activities to Summit, Inc. More detailed information on the contents of the clearance report will be found in Section 3.0.

1.4 FACILITIES AND EQUIPMENT

To support the overall project, facilities and equipment will be marshalled as indicated in the following paragraphs.

1.4.1 Office and Storage Facilities

On-site logistic, administrative and operational support will be provided from a portable office structure to be placed in the general vicinity of search and clearance operations.

1.4.2 Support Equipment

The equipment listed below will be utilized for general operations support and emergency support:

- o Communications - On site communications for normal or emergency operations will be provided by portable transceivers provided to key personnel. A commercial land line or mobile telephone will be available for direct communications to emergency response teams.

- o Vehicles - One 9-12 passenger van will be available on-site for general administration and logistic use.

1.4.3. Detection/Excavation, and Clearance Equipment/Material

Ordnance detection will be accomplished using the Foerster (MK 26) ordnance locator. Excavation of recorded contacts will be accomplished using hand tools. If deep excavation is required, Summit Associates will provide the necessary equipment, i.e., back hoe.

1.5 STANDARD PROCEDURES

The following paragraphs provide general information on routine administrative and operating procedures to be used by UXB while on site. Detailed SOPs for specific activities are provided in Appendix B.

1.5.1 Personnel Employment

Equal employment opportunity will be provided for the limited number of local area laborers required for this project. However, due to the nature of the task and the hazards expected, consideration of the areas listed below will be necessary:

- o Physical Conditioning - Potential hires will be thoroughly briefed as to the physical nature of the work and the potential hazards.

- o Known allergies - Personnel will be asked to list all known allergies or previous reactions to insect bites or medication.

Following employment, the conditions listed below constitute grounds for termination and will result in dismissal:

- o Failure to attend training sessions (immediate dismissal with no pay) or daily briefings (dismissal after one warning).

- o Possession of or being under the influence of alcohol or drugs at the site (immediate dismissal).

- o Failure to comply with prescribed safety procedures/regulations (i.e., smoking in an unauthorized area, failure to wear protective clothing, etc.) (dismissal after one warning).

- o Malingering (dismissal after one warning).

- o Unexcused absence (dismissal after one warning).

1.5.2 General Procedures and Daily Routine

The general procedures and daily routine prescribed below will followed while working on the site. These procedures and routines (except those that concern safety) may be altered by the Project Leader/Safety Officer as deemed appropriate to maximize productivity and to facilitate additional personnel training, if required.

1.5.2.1 On-Site Restrictions

During on-site operations, several restrictions will be imposed on the contractor and authorized visitors. These restrictions are:

- o Access - Will be limited to the contractor or authorized visitors and only via the office facilities

- o Vehicles - Only contractor vehicles will be permitted on the site where ordnance-related activities are in progress

o Unauthorized Vehicles/Personnel - Any observed on the site will be reported to the Project Leader/Safety Officer via radio. If continuation of work poses a hazard to unauthorized personnel, work will be stopped by the Team Leader. Note: It is recognized that control of unauthorized personnel on site will be difficult and subject to the cooperation of Summit authorities.

1.5.2.2 Daily Routine

The on-site daily routine to be used is as follows: (tentative)

o Working hours

- Project Leader/Safety Officer, Team Leaders

  0730-1600 Monday-Friday

  0700-1200 Saturday (if necessary)

o Rest Periods - two fifteen minute rest periods and a 30-minute lunch break. (Additional on-station rest periods at the discretion of the Team Leader.)

o Daily Briefings

- The Project Leader/Safety Officer will brief the Team Leaders on work planned for that day and provide other pertinent information.

- Team Leaders will in turn brief their respective teams.

1.5.2.3. Safety and Maintenance Inspections

Several types of safety and maintenance inspections will be conducted on-site by the Project Leader/Safety Officer at varying frequencies. Table 1-1 provides information on the types and frequency of these inspections. Checklists for some of these inspections are provided as Figures 1-2 through 1-4 and Tables 1-2 and 1-3.

In addition to the inspection listed, the Project Leader/Safety Officer will conduct random inspections of all types at least once each week.

TABLE 1-1
SAFETY AND MAINTENANCE INSPECTIONS

TYPE	NAME	FREQUENCY			RESPONSIBILITY	REMARKS
		DAILY	WEEKLY	MONTHLY		
M	Vehicle	X			Operator	Each vehicle see Figure 1-2
S	Protective Clothing	X			Team Leaders	
M	First Aid Equipment		X		Project Leader	Each kit see Figure 1-3
M	ABC Extinguisher			X	Project Leader	See Figure 1-4
M/S	Diving Equipment	X			Project Leader	
S	Fire Hazards	X			All Key Personnel	
S	Operational	X			All Key Personnel	
M	MK 26	X			Operator	See Table 1-2
M	MK 26		X		Operator	See Table 1-2

S = Safety
M = Maintenance

DAILY VEHICLE INSPECTION LOG

VEHICLE: _____

DRIVER: _____

INSTRUCTIONS:

Each vehicle operator will, at the beginning of each working shift, inspect all items listed below. If any system is found to be non-operational, turn in for required maintenance.

DATE/TIME	BRAKES	PARKING BRAKE	TIRES/ SPARE	HORN	SEATBELTS	LIGHTS/ PARKING BRAKE/ HEADLIGHTS	TURN SIGNALS	WINDSHIELD WIPERS	DEFROSTER	STEERING MECHANISM	SAFETY EQUIPMENT	OPERATOR'S SIGNATURE

Figure 1-5 Vehicle Inspection Log

INSPECTION CHECKLIST

ITEM: FIRST AID EQUIPMENT

FREQUENCY WEEKLY BY PROJECT LEADER

DATE	FIRST AID KITS IN EACH VEHICLE	STORED PROPERLY	EXPENDED SUPPLIES REORDERED/REPLACED

Figure 1-3 Inspection Checklist
First Aid Equipment

INSPECTION CHECKLIST AS OF:_____

ITEM: DRY CHEMICAL EXTINGUISHER

FREQUENCY		MONTHLY		ANNUALLY	
NO. PROPER LOCATION	NOT EXPOSED TO DIRECT SUN	VISUAL INSPECTION CHECK CHARGE AND RESTORE IF REQUIRED	CHECK HOSES, NOZZLES, SUPPORTS BRACKETS	PRESSURIZED UNITS CHECK GAUGE	NON-PRESSURIZED UNITS REMOVE CARD AND WEIGH EXAMINE FILLER - Freely running and powdery

Figure 1-4 Inspection Checklist
Dry Chemical Extinguisher

EMPLOYEE NAME	POSITION	DIRECT SUPERVISOR	NATURE OF ILLNESS/INJURY	CAUSE(S) OF ILLNESS/INJURY	TYPE FIRST AID RENDERED	TIME OF OCCURANCE	TIME RETURN TO WORK	REMARKS

Figure [illegible], First Aid Treatment Log

TABLE 2-2

MK 26 DAILY CHECKLIST

_____ 1. Machine is clean and free of damage to cables, threads, etc.

_____ 2. Operator is not wearing any metallic objects that might give a false reading.

_____ 3. Check that the operating mode switch is on position 1.

_____ 4. Turn the sensitivity switch to the highest sensitivity. 0.3.

_____ 5. If the needle has drifted from zero, press lightly on the compensation pressure switch (COMP). The needle will zero immediately (see also 6.2.2.b of the User Handbook).

_____ 6. To check the sensitivity, press lightly on the sensitivity test switch (Test). The needle should deflect into the negative black scale between 7-10 divisions.

If all is satisfactory then the instrument is ready for use in any operating mode (i.e., 1,2,3,or 4).

_____ 7. The sound can be adjusted to suit the user by tapping lightly on the "Up" volume switch to increase the sound. If no sound is required, then tap the "Down" volume switch.

_____ 8. Data entered in Daily Log/Maintenance Book.

Note: When the instrument is switched off and then switched on again, it will be necessary to adjust for sound as described in item 7 above.

TABLE 2-3

MK 26 WEEKLY CHECKLIST

Perform the following calibration checks in accordance with the User Handbook:

_____ 1. Probe function test configuration

_____ 2. Battery function test

_____ 3. Function check with test function control unit

_____ 4. Function check, probe parallel alignment

_____ 5. Function check, static swing calibration

_____ 6. Testing calibration

_____ 7. Testing absolute channel

_____ 8. Final testing (land version)

1.5.2.4 First Aid Treatment and Medical Emergency

First aid for minor cuts, abrasions, bruises, and sprains will be provided on site by the Project Leader/Safety Officer. If any doubt exists regarding the severity of a wound, bite, or sprain the Team Leader and Project Leader/Safety Officer are responsible for ensuring the injured person is seen by a registered physician. The Project Leader is responsible for maintaining a daily treatment log (Figure 1-5) of all first aid administered regardless of severity.

1.5.2.5 Safety and Health Training

UXB will provide training to all personnel and employees before the commencement of on-site operations. Training in operational and safety procedures and accident prevention will be continuously stressed and revised. The Project Leader/Safety Officer is responsible for the planning and execution of the training program and for the maintenance of training records. (See Figures 1-6, Training Attendance Record, and 1-7, Employee Training Record).

The EOD Team Leaders will assist in training and the daily promotion of safety. Training is divided into the areas discussed below:

- o General Training - General training will be given to all personnel prior to the start of on-site operations, and as required during actual operations. Training for newly arrived personnel will be provided as they come on board. This training will concentrate on the following areas:

- Work Site Procedures - Identification of work to be performed, work hours, employee parking, transportation to assigned work, protective equipment to be worn, and safety procedures and responsibilities of all employees

- Accident Prevention - Detection of unsafe behavior and conditions in order to prevent accidents

- Personnel Safety - Prevention of injury and minimization of frequency and severity of injuries and occupational illnesses resulting from operations conducted at project sites (including local hazards and heat/cold stress)

- Fire Prevention - Instilling in all employees an awareness of natural and man-made fire hazards that exist at the project site and the steps that will be taken to minimize fire risk

- First Aid - Location and availability of first aid supplies on site. Identification of known hazards and initial response measures to be taken.

o Operational Training - Each employee will be trained for his or her specific job assignment. This training will be accomplished by the Project Leader/Safety Officer, and/or by the assigned Team Leader. The employee will be thoroughly instructed in the safest and most

efficient methods of performing the assigned job. On-site operational training will include the use of display boards and photographs showing ordnance and other hazards that may be encountered during the operations. Each employee will receive the appropriate training before initial operations, and periodically throughout the operation, as required for refresher training.

- Emergency Procedures Training - On-site training on the emergency action procedures contained in Appendix A will be conducted to ensure each employee is familiar with his/her responsibility in the event of emergency. Training will be conducted in the following areas:
  - Explosive Accident/Incident
  - Fire
  - Medical Emergency.

TRAINING ATTENDANCE RECORD

EMPLOYEE NAME POSITION

ADDRESS PHONE NUMBER

DATE	COURSE	MANDATORY/FREQ.	NEXT SCHEDULED DATE

Figure 1-6. Training Attendance Record

EMPLOYEE TRAINING LOG

ATTENDANCE RECORD DATE/TIME

TITLE OF CLASS INSTRUCTOR

NAME
POSITION

Figure 1-7. Employee Training Log

1.5.3 Vehicles

UXB vehicles will be operated on site only by operators designated by the Project Leader/Safety Officer. All vehicles will be equipped with first aid equipment. SOPS for these vehicles are contained in Appendix A.

1.5.4 Handling and Disposition of Explosive Material

Procedures for the handling and disposition of hazardous items and scrap materials discovered during the clearance are contained in Appendix A. These procedures are tentative pending concurrence of the Edison, NJ Police Department. The POC is Captain Shirley, (201) 287-0900.

1.6 EMERGENCY ACTION PROCEDURES

Every effort will be made through preparation, training, and procedures to preclude any requirement for emergency action on site. Prior to the commencement of on-site operations, coordination will be effected with the nearest emergency response activity, i.e., fire explosive, medical.

The POC will be Captain Shirley of the Edison Police Department.

In compliance with the desires of these activities, contractor involvement in the response to fire explosive, accident/incident, and emergency medical treatment will be minimized.

Appendix A contains the emergency action procedures for explosive accident/incident, fire and medical emergency response. Emergency response phone numbers are provided below:

Agency	POC	Phone #
UXB Program Manager	John Boyden	(703) 385-6622
Local Authorities to be included:	_____	_____

On site accidents/incidents or injuries will be investigated and fully documented by the Project Leader/Safety Officer and kept on file for the following:

- On-the-job injury or illness that results in loss of a work day
- Work-related fatalities
- Diagnosed work-related illnesses
- All work-related injuries requiring medical treatment other than first aid, such as loss of consciousness or restriction of work or motion, which would result in job termination
- Theft of hazardous material
- Fire (accidental)
- Explosion (accidental)
- Property Damage (in excess of $700.00).

All accidents/incidents will be investigated to determine contributing causes and preventative measures to be taken to eliminate or reduce the number of accidents. Even accidents of a minor nature will be reported and investigated so preventative steps can be taken to ensure similar circumstances do not result in more severe accidents. All injuries/illnesses will be reported to the Project Leader/Safety Officer who will take immediate action to accomplish the following:

- Interview the injured person before he/she is sent home or to the hospital (if delay of treatment will not jeopardize the injured person)

- Visit the scene of the accident to observe conditions as they were or might have been at the time of accident

- Obtain details of the injury from the medical department/hospital

- Prepare or obtain photographs, diagrams, sketches, and maps, warranted by the circumstances

- Confer with Team Leaders, and witnesses for information as to the cause of the accident

- Examine safety, medical, and personnel department records on the injured person's history, physical condition, and accident experience

SECTION TWO

OPERATIONAL PROCEDURES

2.0 INTRODUCTION

This section provides the detailed procedures to be used by UXB for the ordnance clearance operations to be conducted at the Summit Associates Newfield Site.

2.1 SURFACE SEARCH PROCEDURES

The six acre site will be marked off in definable grids. Each grid will be further divided into 12 ft. wide lanes. The surface search team structure considered most effective for the Summit project is two EOD trained specialists and two laborers. The procedure used is a standard military line abreast procedure with the four searched forming a line 2-3 feet apart. The Project Leader will direct the operation and take charge of any explosive ordnance found during the sweep. Grid evaluation will vary depending on the terrain and ground cover. Ordnance-related items and scrap will be collected and removed from the area for subsequent disposition prior to commencing subsurface operations.

2.2 SUBSURFACE SEARCH PROCEDURES

The subsurface search team structure for this project will consist of two EOD trained specialists and up to three laborers. Again the UXB Project Leader will supervise the overall operation. The subsurface search team will utilize the previously established grid areas and 12 ft. lanes to conduct the

subsurface search using a standard MK 26 ordnance locator. Commercial metal detectors may be used to assist in locating non-ferrous ordnance items and to back up the MK 26.

The ordnance locator operator, using the MK 26, will search along the control line for subsurface contamination. When a contact is found, under the close supervision of the EOD specialist, it will be checked by hand to determine if the contact is on or just below the surface. If the contact is buried, the contact will be verified again with MK 26 locator and will be excavated.

Subsurface excavations will be accomplished using hand tools and under the supervision of the UXB EOD specialist. If it is determined that mass ordnance contamination exists, it may be necessary to utilize a back hoe. At all times ordnance excavations will be carried out using standard explosive ordnance disposal procedures and safety precautions.

2.3 DISPOSITION OF MATERIAL

All material found during the clearance will be sorted into three categories, which are defined below:

- Hazardous Ordnance - any item that either contains explosives or is assumed to contain explosives. When found, they will be identified, removed, and temporarily stored at a predesignated site close to the work site. The Edison Police Department (EOD) will be contacted for further disposition and or disposal.

- Scrap Ordnance - Any item that is ordnance related in some way but is not hazardous. These items will be stored in a secure area until final disposition has been determined.

- Any man-made item that is not ordnance related. This material will be placed in a receptacle for normal disposal.

2.4 DATA RECORDING

Data from each sector will be recorded on site onto specific data sheets. Figure 2-1 is an example of this sheet. Data to be recorded includes information taken from the sector as well as the items collected on the grid. Data will also include the locations of any hazardous ordnance discovered. The recorded data will be provided to the Summit Site Coordinator and to the UXB Project Leader/Safety Officer for further analysis.

2.5 MEASURES OF EFFECTIVENESS (QUALITY ASSURANCE)

The effectiveness of the clearance operations to be completed will be measured by random unannounced check searches selected sectors or portions of sectors as determined by the Project Leader/Safety Officer. The frequency of these searches will vary but, in general, approximately 5 percent of the clearance sectors will be searched a second time. If, on the second search, additional material is located, that sector will be continuously swept until no material is located.

CLEARANCE SEARCH DATA

GRID:_____

LANE:_____

DATE:_____

NUMBER OF LABORERS:_____

NUMBER OF TECHNICIANS:_____

TECHNICIAN'S NAMES:_____

LOCATOR/EXCAVATOR TIME

START:_____ LOCATOR FINISH:_____ EXCAVATION FINISH:_____

CONTACTS RECORDED:_____

CONTACTS EXCAVATED:_____

NUMBER	TYPE	DEPTH
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

WEIGHT:_____

REMARKS:_____

_____

Figure 2-1 Clearance Search Data Sheet

SECTION THREE

REPORTS

3.0 INTRODUCTION

Documentation of the ordnance clearance operations shall include ordnance related material located and removed, the estimated effectiveness of the overall effort and assessment of the risk. The types and frequency of reports that will be provided to Summit by the UXB team are discussed in the following subsections.

3.1 WORK STATUS REPORTS

The UXB Project Leader/Safety Officer will meet with designated Summit personnel to informally discuss work status including, but not limited to, clearance work completed, material found, and problems encountered. This information will be compiled and provided to Summit and the UXB Program Manager each week.

3.2 FINAL REPORT OF ORDNANCE CLEARANCE OPERATIONS

Upon completion of the clearance operation a formal report will be developed and forwarded to Summit, Inc. for retention.

D. Safety Requirements

APPENDIX A

STANDARD OPERATING PROCEDURES (SOPs)

OPERATING PROCEDURES FOR MOTOR VEHICLES

A. Purpose

To establish standard operating procedures for the use of contractor vehicles at the Summit site.

B. General

1. "Motor Vehicle" is defined as any vehicle propelled by a self-contained power unit, except a vehicle designed solely for use on railways, or equipment designed for exclusive use off the highway.

2. Anyone operating a motor vehicle of any kind shall possess a valid driver's license for that particular vehicle type. This license shall be with the driver whenever he/she operates the vehicle.

C. Maintenance

1. All vehicles will be inspected each day before work begins. The form shown in Figure 2-2 will be used as a checklist for inspection.

2. Any vehicle that has any item marked "failed" on the Daily Vehicle Inspection Checklist will be repaired before re-use.

[illegible] ...les of defensive driving [illegible] ...ractical.

D. Safety Requirements

1. During Operation.

(a) The operator must at all times have the vehicle under such control as to be able to bring it to a complete stop within the assured clear distance ahead.

(b) No vehicle shall be driven on a downgrade with gears in neutral or clutch disengaged.

(c) No vehicle shall be stopped, parked, or left standing on or beside any road in any area in such a manner as to endanger the vehicle, other vehicles, equipment, or personnel using or passing that road or area.

(d) No vehicle shall be left unattended until after the motor has been shut off, the key removed (unless local regulations prohibit), the parking brake set, and the gears engaged in low, reverse, or park. If stopped on a hill or grade, front wheels shall be turned or hooked into the curb or the wheels securely chocked.

(e) When backing or maneuvering, a signal person will be used when operation site is not in full view, vehicles are backed more than 100 ft, terrain is hazardous, or 2 or more vehicles are backing in the same area.

(f) The principles of defensive driving shall be practiced.

(g) Seat belts will be installed and worn.

2. Transporting Personnel

(a) The number of passengers in passenger vehicles shall not exceed the number which can be seated. Passengers in the front seat will wear seat belts.

(b) Trucks used to transport personnel shall be equipped with a securely anchored seating arrangement, a rear end gate, and guard rail. Steps or ladders for mounting and dismounting shall be provided.

(c) All tools and equipment shall be guarded, stowed, and secured when transported with personnel.

(d) No person will be permitted to ride with arms or legs outside truck body, while standing on the truck body or on running boards, or while seated on side fenders, cabs, cab shields, rear or truck, or on the load.

(e) All vehicles transporting personnel shall be enclosed during cold or inclement weather.

(f) No explosives, flammable materials (excepting normal fuel supply), or toxic substances shall be transported in vehicles carrying personnel.

(g) No vehicle that is transporting personnel shall be moved until the driver has ascertained that all persons are seated, the guard rails and rear end gates are in place, and all doors are closed.

(h) Getting on or off any vehicle while it is in motion is prohibited.

3. Fueling

(a) All motor vehicles shall be turned off before and during fueling operations.

4. Loading

(a) To help prevent accidents, drivers of trucks and similar vehicles shall leave the cabs of their vehicles while the vehicles are being loaded to help (unless the cabs are adequately protected).

(b) The load on every vehicle shall be distributed, chocked, tied down, or secured.

OPERATING PROCEDURES FOR HANDLING OF POTENTIALLY EXPLOSIVE ITEMS

A. Purpose

To establish SOPS for the handling of potentially explosive items and to ensure maximum safety.

B. General

Explosive items will be removed from the grids by UXB EOD technicians for future disposition as directed by the Edison Police Department.

C. Objective

To remove all potentially explosive items found during the Summit Newfield Clearance safely and efficiently.

D. Action

All personnel will familiarize themselves with this SOP.

E. Responsibility

1. UXB Program Manager - has the ultimate responsibility for the safe execution of the UXO Search and Clearance Plans.

2. Project Leader/Safety Officer - has overall responsibility for the implementation, daily administration, and coordination of the Safety Plan. Makes sure that all employees have attended the course on Explosive Ordnance Hazards and Identification.

3. Team Leaders - reinforce in all laborers the need for safety and the prohibition against touching any item that they cannot identify.

4. Laborers - Notify the Team Leader of any item that looks suspicious.

F. General Procedures

Laborers will not pick up any items that are not recognizable as inert or as scrap metal. Unrecognizable items will be inspected by the EOD Team Leader for explosives and the following actions will be taken:

1. If the item is inert, or if it is scrap metal, it will be moved outside the sector for disposition as directed by the Project Leader.

2. If the item is assumed to, or does, contain explosives, it will be marked and moved to the pre-designated holding area for final disposition. The Edison Police Department will direct disposition.

3. The EOD Team Leader will move potentially explosive items to the designated holding area by hand carrying the item in accordance with prescribed military procedures for explosive material handling. Hand carrying will be limited to the shortest distance possible where the item will placed in a holding area for further movement by Government EOD.

EMERGENCY ACTION PROCEDURES (EAPS) FOR EXPLOSIVE ACCIDENT/INCIDENT, FIRE AND MEDICAL EMERGENCY

Coordination with Edison, NJ Police authorities has been completed and emergency response to the work site will be provided using these facilities. The capability available includes the full range of emergency response to the various potential hazards anticipated on site including fire medical response (advanced life support and helicopter evacuation). Response times vary depending on the situation and location of the emergency but will generally be within 10 minutes of receipt of the alert. The following paragraphs describe UXB's emergency procedures to initiate action from the local emergency teams.

A. EMERGENCY WARNINGS

Radio communications will be used to alert all personnel of any emergency situation and give instructions on what actions are to be followed.

B. RESPONSIBILITIES

In the event of an accident/incident, responsibilities are assigned as follows:

1. Project Leader/Safety Officer - has overall responsibility for implementing appropriate EAP and notifying necessary local area emergency response teams (i.e., fire department, police, ambulance). The Project Leader/Safety Officer will maintain all records of

accidents/injuries occurring on the job. He will be in charge at the scene of the emergency. He will be responsible for supervision of all personnel at the scene. He will direct the emergency operation until the arrival of the emergency response team.

2. Team Leaders - will be responsible for ensuring that all emergency situations are reported immediately to the UXB Project Leader. They will supervise and direct the employees under them and take precautionary steps to ensure an emergency situation does not escalate. They will assemble their teams to support emergency operations as directed by the Project Leader/Safety Officer.

C. EXPLOSIVE INCIDENT/ACCIDENT

In the event of an explosive incident, all range operations will stop. A complete review of all events leading to the incident will be conducted to determine the cause an to identify negligence, if any, and lack of supervision or training. Immediate corrective actions will be implemented. In the event of injury to personnel from an explosive incident, key personnel will initiate action as follows:

Team leaders will notify the UXB Project Leader to:

1. Give nature of injuries
2. Give exact location
3. Request medical assistance
4. Station personnel on the road to direct medical personnel to the scene.

Medical personnel will:

1. Get specific details on the nature of the injuries
2. Determine exact location
3. Respond to the scene with the required first aid equipment.

The Project Leader/Safety Officer will notify the appropriate agencies and/or medical facilities.

The Project Leader/Safety Officer will:

1. Notify within 4 hours of incident: Howarth Gilmore, Summit Associates, Inc. (201)225-2900.
   John Boyden, (UXB) 1-800-422-4892.
2. Ensure that written reports by all concerned personnel, including the EMT, Team Leader, and other witnesses, are submitted to the two people mentioned above not more than 3 days after the incident.

D. FIRE FIGHTING PLAN

In the event of a fire on the site, the following actions will be initiated by key personnel:

1. Report fire to the UXB office facility.
2. Give exact location.
3. Evacuate all personnel to the UXB office facility.
4. Notify the Project Leader/Safety Officer when clear of the fire area.

The Project Leader/Safety Officer will:

1. Notify local authorities through the 911 Emergency Phone System.
2. Monitor evacuation of contractor personnel from the scene.
3. Assist emergency response teams as required.
4. Report fire to the UXB Program Manager.
5. Report fire to the Summit Program Manager.

In the event of evacuation, each Team Leader is responsible for ensuring that all assigned sweep team members are present before evacuation. The Project Leader/Safety Officer will be notified if all team members are not accounted for.

E. MEDICAL EMERGENCY

Medical emergencies may develop as a result of unintentional explosion, industrial-accident, or from environmental influences (rough terrain, heat, cold, etc.).

In the event of any medical emergency, the Project Leader/Safety Officer will be notified immediately.

1. Get specific details on the nature of the medical emergency
2. Determine exact location
3. Respond to the scene, with the required first aid equipment
4. Call for local area emergency response team
5. Record all actions taken on the Daily Treatment Log.

If a medical emergency results in time lost on the job, the Program Manager will ensure that written reports are submitted by all concerned

personnel, including the Project Leader/Safety Officer, EMT, and other witnesses. A complete review of all events leading up to the accident will be conducted to determine the cause and to identify negligence, in any, or lack of supervision or training. Immediate corrective actions will be implemented.

F. INDUSTRIAL ACCIDENT

Industrial accidents include all mishaps not involving an unintentional explosion. Depending on the type and seriousness of the incident, work may or may not be stopped. All industrial accidents will be recorded by the Project Leader/Safety Officer on the Daily First Aid Treatment Log (Figure 1-5). A complete review of the event will be conducted to determine if there was negligence, lack of supervision or insufficient training.

The Project Leader/Safety Officer shall ensure written reports are submitted by concerned personnel if the accident involves "time lost" by personnel or equipment. Accidents will be reported on OSHA Form 200, and applicable insurance forms.

APPENDIX B

LESSON GUIDES

This Appendix contains lesson guides for the following training lectures:

B-1 General Safety

B-2 Explosive Ordnance Hazards and Identification

B-3 Accident Prevention

B-4 Fire Prevention

LESSON GUIDE

TOPIC: GENERAL SAFETY

OBJECTIVE: To prevent injury and minimize the frequency and severity of injuries and occupational illnesses resulting from operations conducted at the Summit site.

CONDITIONS: A classroom environment and continuous training on site throughout the work day.

STANDARDS: All employees will wear protective clothing and accessories as required by the job to be performed.

A. INTRODUCTION

1. General safety encompasses many areas within the work environment.
   a. Proper protective equipment - clothing and accessories designed to protect against hazards
   b. Protection against natural hazards - wildlife, insects, vegetation, and weather
   c. Protection against man-made hazards - high explosive (HE) and unexploded ordnance.

B. PROTECTIVE CLOTHING

1. Gloves may be worn to protect against cuts or abrasions.
2. It is recommended that some type of hat be worn to protect your head and

Use a foot powder and wear two pairs of socks to help prevent blisters. We will be doing a lot of walking and blisters can become infected. If you get blisters, have the Safety Officer look at them and provided treatment to prevent infection.

F. SUMMARY

You are required to wear the safety/protective equipment provided. Inform your Team Leader or the Project Leader/Safety Officer if you have any problems with the safety requirements or you don't understand the rules.

SAFETY IS EVERYONE'S RESPONSIBILITY!

G. ARE THERE ANY QUESTIONS?

LESSON GUIDE

TOPIC: EXPLOSIVE ORDNANCE HAZARDS AND IDENTIFICATION

OBJECTIVE: To prevent injury or death caused by carelessness or mishandling of unexploded ordnance items or their fillers.

CONDITIONS: A classroom environment, weekly review, and daily reinforcement.

STANDARDS: All employees will be made aware of the explosive ordnance hazards expected and will be required to observe all safety precautions.

TRAINING AID: Display board and/or photos.

A. INTRODUCTION

1. Ordnance items come in many shapes, sizes, and colors, and contain various fillers.

a. Shapes

(1) Projectiles

(2) Casings

(3) Mortars

(4) Fuzes

(5) Small complete rounds

(6) Tubes

(7) Grenades

(8) Mines

(9) Bombs

b. Sizes

(1) 22 cal--155 mm

(2) Bombs--sizes vary

c. Colors

(1) Brown

(2) Black

(3) White

(4) Green

(5) Rust

(6) Blue

(7) Orange

(8) Silver

d. Fillers

(1) High explosive (HE)

(2) Illumination

(3) Plaster

(4) Concrete

(5) White Phosphorus (WP)

2. Specific Hazards

a. HE Fillers

(1) Although relatively insensitive to shock, becomes more hazardous with age and when burned.

(2) The composition is also very irritating to the skin, eyes, and respiratory system.

(3) Do not pick up, kick or disturb. Call your Team Leader.

b. Fuzes

(1) Contain explosive materials that are very shock-sensitive.

(2) Should be treated with utmost care (do not touch--call your Team Leader).

c. Illumination

(1) Material burns with extremely bright intensity that can cause severe eye damage.

(2) Because the material is pyrotechnic, it creates the potential for extremely serious burns and fires.

d. White Phosphorus (WP)

(1) When exposed to oxygen, WP produces a dense white smoke and severe burns (if touched). In the event a smoking ordnance item is observed, leave the area immediately and notify your Team Leader.

(2) Should you get WP on your skin, immediately notify your Team Leader. Immerse the affected area in water or cover it with wet sand or mud to cut off the oxygen supply.

(3) Assistance will be provided by the EMT and other medical authorities.

B. PREVENTATIVE MEASURES

1. Leave ordnance items alone.

2. Don't smoke or introduce fire around explosives or ordnance items.

C. SUMMARY

1. When in doubt, leave it alone! Although ordnance items may be severely damaged, may be old, and may have been exposed to the elements for many years, they still possess the potential to explode.

2. SAFETY IS EVERYONE'S RESPONSIBILITY!

D. ARE THERE ANY QUESTIONS?

LESSON GUIDE

TOPIC: ACCIDENT PREVENTION

OBJECTIVE: To detect unsafe behavior or acts that may result in an accident or injury.

CONDITIONS: A classroom on-site during the work day.

STANDARDS: All personnel will practice safe methods of lifting and placing heavy objects, will wear protective clothing, and will practice fire safety.

A. INTRODUCTION

1. Accidents result in over 2.3 million injuries and 13,000 deaths each year. They are caused by such things as:
   - o Falling
   - o Being hit
   - o Extreme temperature exposure

2. Accidents cause:
   - o Lost time
   - o Lost wages
   - o Production slowdown
   - o Personal misery

3. Any job can be dangerous if not done properly.

B. CAUSES OF ACCIDENTS/INJURIES

1. State of Mind:

- o Carelessness
- o Tired
- o Showing-off
- o Inexperience
- o Failure to follow safety rules
- o Forgetfulness

2. Conditions at Work:

- o Dangerous overhead objects
- o Flammable liquids
- o Poor housekeeping
- o Tools not put away properly

WATCH FOR SAFETY HAZARDS AND REPORT THEM TO YOUR TEAM LEADERS!

C. PREVENTION

1. Wear the clothing and protective gear required by your job.

2. Do the job properly.

- o Follow instructions and procedures. If you don't know how to do something, ASK!
- o Maintain equipment in good repair. Report wear or damage to your Team Leader.
- o No horseplay or roughhousing.

3. ABSOLUTELY NO ALCOHOL OR DRUGS ARE ALLOWED ON THE SITE OR IN YOUR VEHICLES. If anyone is found with these items on their person or in their vehicle it will mean IMMEDIATE DISMISSAL. If anyone shows up under the influence of alcohol, he/she will not be allowed to work.

4. Know where fire extinguishers are located and how to use them.
   - o ALL VEHICLES WILL HAVE FIRE EXTINGUISHERS.
   - o To use an extinguisher, remember PASS:

     Pull the pin

     Aim nozzle at base of fire

     Squeeze handle or lever

     Sweep nozzle back and forth at base of fire.

5. Watch where you are going, especially here at the site. There are potential hazards as well as loose soil and gravel.

6. Move things properly.
   - o Most accidents resulting from moving things can be prevented if you follow these six basic rules:
     - GET HELP if in doubt you can move an object yourself.
     - WEAR SHOES appropriate for the job - no tennis shoes or slick-soled shoes.
     - KEEP HANDS IN THE CLEAR - fingers can be crushed when a load is not put down carefully.
     - WEAR GLOVES to protect against cuts, scratches, and burns.
     - GET A GOOD GRIP to make carrying easier and to protect your fingers and toes.

o Lifting

- LOOK OVER the object to be lifted. Make sure it is not too heavy or clumsy for good balance.
- STAND CLOSE to the load, keep feet apart for good balance - one foot alongside the load, one behind.
- BEND YOUR KNEES and straddle the load. Keep your back as straight as possible.
- GET A GOOD GRIP - many lifting accidents occur when the load slips from the hands.
- LIFT GRADUALLY, straighten your knees, and stand. Use your legs, not your back. Avoid jerky motions.

IF AN OBJECT IS TOO HEAVY, LARGE, BULKY, LONG, OR HARD TO HANDLE, FIND ANOTHER PERSON TO HELP YOU!

o Carrying

- KEEP THE LOAD CLOSE TO YOUR BODY - use the mechanical leverage of your body.
- MAKE SURE YOU CAN SEE YOUR PATH CLEARLY.
- AVOID TWISTING YOUR BODY - use your feet to change direction.
- DON'T CHANGE YOUR GRIP unless the weight is supported.
- FACE THE SPOT YOUR LOAD IS TO REST ON.

o Putting it down

- BEND YOUR KNEES TO LOWER LOAD.
- WATCH YOUR FINGERS AND TOES.
- BE SURE THE LOAD IS SECURE to prevent it from falling.

D. SUMMARY

PROTECT

- o Your health
- o Your job
- o Your pocketbook

TAKE CARE don't take chances on little things, like

- o blisters
- o small cuts
- o jammed fingers
- o burns
- o broken fingers or toes

<u>SAFETY IS EVERYONE'S JOB</u>!

E. ARE THERE ANY QUESTIONS?

LESSON GUIDE

TOPIC: FIRE PREVENTION

OBJECTIVE: To instill in all employees an awareness of the fire hazards that exist at the project site and steps to be taken to minimize the possibilities of injury or death and prevent the risk of fire.

CONDITIONS: A classroom environment and on a continuing basis during the work day.

STANDARDS: Each employee will follow the rules and guidelines set forth in this lesson and the UXB Safety Plan.

A. SAFETY PRECAUTIONS

Smoking is permitted ONLY in the designated smoking areas. Use proper receptacles for extinguishing smoking materials.

B. FIRE ON THE SITE

1. Team Leader will:
   a. Report all fires to the office facility immediately.
   b. Give exact locations.
   c. Request assistance if required.
   d. Initiate evacuation of team to the operations center.

e. Report completion of evacuation and verification of all team members.

NOTE: If you are required to evacuate, report to your Team Leader.

DO NOT LEAVE THE AREA WITHOUT YOUR TEAM!

C. FIRE FIGHTING EQUIPMENT available:

1. Vehicles

a. Fire extinguishers

b. Shovels

c. Rakes

2. Office Facility - all additional extinguishers and equipment will be located at the office facility.

D. PROPER USE OF FIRE EXTINGUISHERS

1. Fire extinguishers are designed to be used on small fires only. If the fire is beyond your team's capability, your Team Leader will evacuate you to the office facility.

2. Operation

Remember the buzz word - PASS

Pull the pin

Aim nozzle at the base of the fire

Squeeze the lever or handle

Sweep the nozzle from side to side at the base of the fire.

E. SUMMARY

1. All personnel shall be aware of the fire hazards and safety precautions that apply while working on the project. All employees are responsible for immediately reporting any violations of fire prevention rules to their Team Leader.

2. SAFETY IS EVERYONE'S RESPONSIBILITY!

F. ARE THERE ANY QUESTIONS?

APPENDIX B

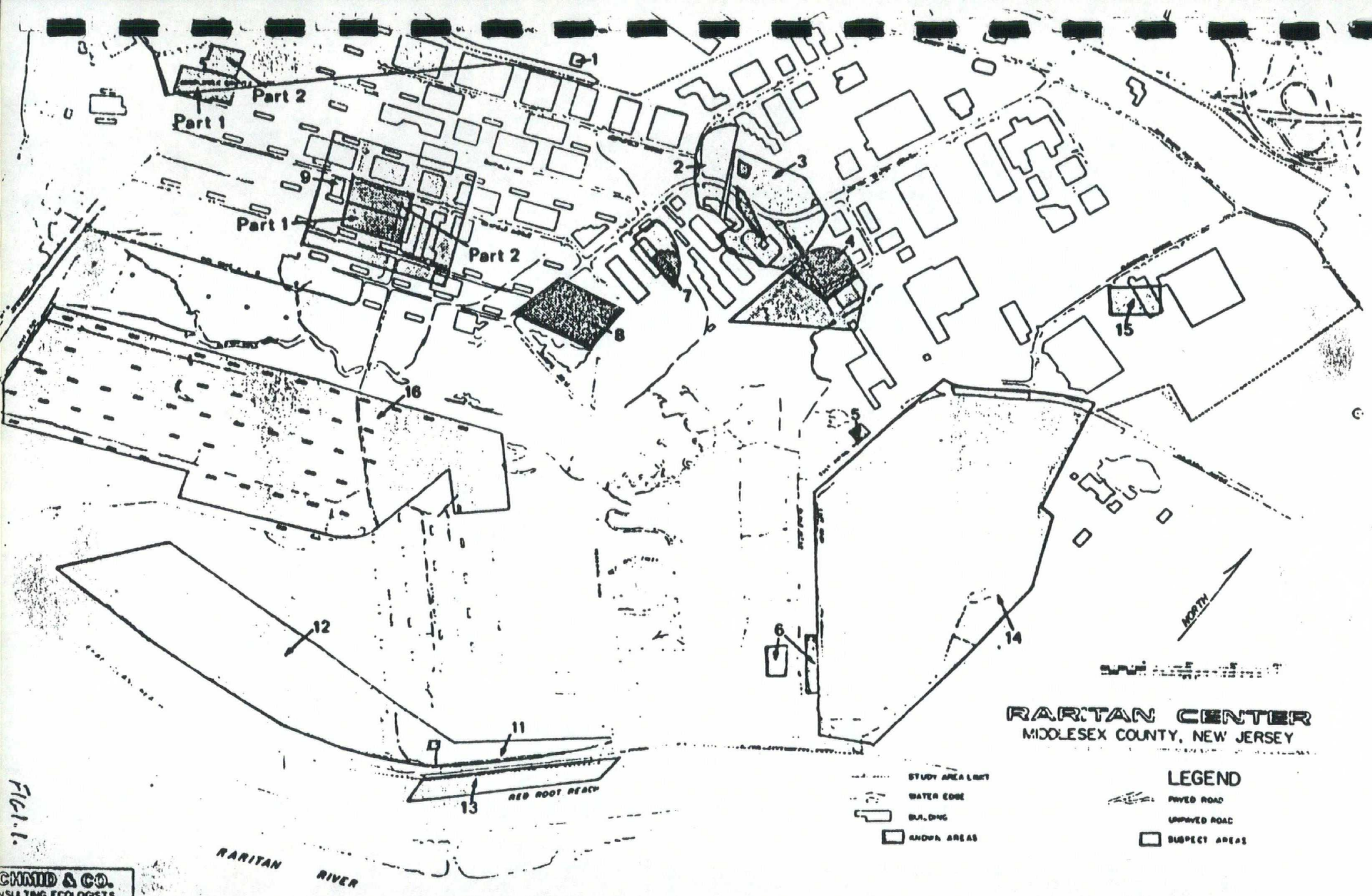

Fig 1.1

CHMID & CO.
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CONTAMINATED AREAS

D-418 GENERAL PLAN

16 OCTOBER 1963
(US DEPT OF THE ARMY,
ORDNANCE CORPS,
OFFICE OF ARSENAL FACILITIES DIVISION)

APPENDIX C

SITE SURVEY MAPS AND DATA

ONITORING WELLS - ELEVATIONS
[redacted]RIEN AND GERE - RARITAN CENTER

APR 14 1989

ENGINEERS / SURVEYORS
MARCH 24, 1989 REVISED APRIL 12, 1989

[redacted]NITORING [redacted]. NO.	CONCRETE PAD ELEV.	TOP CASING ELEV.	TOP PVC PIPE ELEV. (UB & C EDISON)	TOP PVC CAP ELEV.	AREA NO.
[redacted]W-4	14.52'	17.19'	17.10'	17.14'	9
[redacted]W-5	4.97'	7.40'	6.88'	NO CAP	9
1W-6	5.93'	8.38'	8.26'	8.35'	9
[redacted]W-7	28.91'	31.39'	30.10'	NO CAP	1
[redacted]W-8	28.17'	31.30'	30.15'	30.24'	1
[redacted]W-9	27.87'	30.66'	29.71'	29.77'	1
[redacted]W-10	13.84'	16.54'	15.84'	15.89'	7
1W-11	11.90'	13.90'	13.62'	13.67'	7
[redacted]W-12	12.44'	14.73'	14.57'	NO CAP	7
[redacted]W-13	(LOOSE) 26.44'	29.10'	28.76'	28.80'	2
[redacted]W-14	21.08'	23.20'	22.95'	NO ELEV. ON PRESSURE CAP	3
[redacted]W-15	13.42'	15.82'	15.78'	NO CAP	3
1W-16	(NO CONC.) 9.2 GROUND	11.10'	10.86'	10.92'	6
[redacted]W-17	(LOOSE) 9.06'	(LOOSE) 11.92'	10.75'	10.83'	3
[redacted]W-18	20.75'	23.57'	[redacted] 23.48	NO CAP	3,4
[redacted]W-18A	(LOOSE) 17.89'	(LOOSE) 20.54'	20.27'	——	3,4
[redacted]W-19	5.82'	8.54'	8.22'	8.28'	4,5
1W-20	10.48'	13.01'	12.27'	12.33'	5
[redacted]W-21	4.36'	6.72'	5.79'	5.88'	5
1W-22	4.96'	7.36'	6.94'	6.98'	5
[redacted]W-25	4.81'	7.51'	7.16'	7.23'	6
[redacted]W-26	(NO CONC.) 9.0' GROUND	11.83'	10.86'	10.92'	6
[redacted]W-27	5.41'	8.01'	7.81'	7.86'	6
[redacted]W-28	3.84'	6.49'	5.94'	NO ELEV. ON PRESSURE CAP	11
[redacted]W-29	4.32'	6.82'	6.61'	6.68'	11
[redacted]W-30	2.97'	5.35'	5.02'	5.07'	11
[redacted]					
[redacted]					
[redacted]					1 OF 3

ARITAN ARSENAL, EDISON, N.J.
NITORING WELLS - ELEVATIONS

MARCH 24, 1989
REVISED APRIL 12, 1989

ITORING L NO.	CONCRETE PAD ELEV.	TOP CASING ELEV.	TOP PVC PIPE ELEV.	TOP PVC CAP ELEV.	AREA NO.
W-31	28.58	30.81'	30.65'	30.71'	1
N-34	5.14'	7.09'	6.53'	6.59'	6,5
N-35	32.11'	34.53'	33.73'	33.79'	15
W-36	25.25'	27.43'	26.86'	26.92'	15
N-37	28.91'	31.08'	30.85'	----	15

RINGS - ELEVATIONS

RING NO.	GROUND OR BIT. PAVING ELEV.	AREA NO.	BORING NO.	GROUNDOR BIT. PAVING ELEV.	AREA NO.
1	11.00'	9	B-19	11.58'	4
2	11.47'	9	B-20	12.5'	4
-3	8.55'	9	B-21	11.08'	4
4	30.9'	1	B-22	14.2'	4
-5	27.7'	1	B-28	5.6'	6
6	27.6'	1	B-29	5.3'	6
7	12.79'	7	B-30	4.2'	6
-8	12.88'	7	B-31	42.8'	15
9	11.4'	7	B-32	36.4'	15
-10	29.2'	2	B-33	33.0'	15
11	17.46'	2			
12	23.3'	3			
-13	20.48'	3			
14	15.55'	3			
-15	18.92'	3			
16	29.0	3			
17	13.1'	3			
-18	14.79'	3			

ARITAN ARSENAL, EDISON, N.J.
ALLOW SOIL SAMPLES - ELEVATIONS

MARCH 24, 1989
REVISED APRIL 12, 1989

SOIL SAMPLE NO.	EXISTING GROUND ELEV.	SOIL SAMPLE NO.	EXISTING GROUND ELEV.
SS1-1	30.6'	SS6-1	CAN'T FIND
SS1-2	29.3'	SS6-2	CAN'T FIND
SS1-3	27.7'	SS6-3	3.5'
SS1-4	27.6'	SS9-1	7.5'
SS2-1	30.8'	SS9-2	7.5'
SS2-2	28.6'	SS9-3	7.6'
SS2-3	27.8'	SS11-1	4.0'
SS2-4	CAN'T FIND	SS11-2	3.1'
SS2-5	29.8'	SS11-3	3.6'
SS2-6	31.6'	SS15-1	36.8'
SS2-7	26.0'	SS15-2	36.2'
SS3-1	19.8'	SS15-3	35.7'
SS3-2	12.2'	SS15-4	37.7'
SS3-3	14.9'	SS15-5	38.5'
SS3-4	16.7'		
SS3-5	22.6'		
SS3-6	27.9'		
SS3-7	26.4'		
SS4-1	10.3'		
SS4-2	10.8'		
SS4-3	14.2'		
SS4-4	9.5'		
SS4-5	7.9'		
SS4-6	5.2'		
SS4-7	5.0'		
SS4-8	5.4'		

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AREA CODE 201

O'BRIEN & GERE
RARITAN CENTER, EDISON, N.J.
MONITORING WELLS

IN> LIST PTS 240 305

POINT TABLE

FIG #	PT #	NORTHING	EASTING	ELEVATION	IDENTITY	AREA
	270	611149.2627	2089283.6622		MW-13	2
	240	606827.9146	2088312.5454		MW-5	9
	241	607075.3488	2088589.9343			
	242	607978.3014	2088852.1310		MW-6	9
	243	612506.0524	2093907.7372			
	244	605966.8503	2089150.9888			
	245	611721.6210	2090667.8664			
	249	607641.1419	2087911.0333			
	248	607789.5663	2087715.4797			
	247	607767.8742	2087681.4255			
	246	607719.1841	2087573.5768			
	251	608011.6508	2087851.4453			
	252	608258.6837	2088169.3093			
	257	609897.5672	2089691.4079		MW-10	7
	256	609992.1259	2089988.8534			
	255	610010.1875	2089986.7726			
	254	609965.5221	2090394.6739		MW-12	7
	253	609572.3760	2090330.2793		MW-11	7
	258	610113.4861	2090309.9974			
	289	611451.9201	2090779.3243			
	290	611487.3679	2090970.6057			
	261	610591.1181	2090050.3755			
	260	610665.9965	2090739.6912			
	263	611084.4122	2090498.4029			
	262	610968.2880	2090223.8139			
	266	611222.6466	2091607.9747			
	265	611272.0105	2091316.3183			
	264	610943.0401	2091280.6411			
	267	611480.4314	2091448.1266			
	269	610967.8908	2090983.2398			
	268	611308.9392	2090917.8773			
	259	610406.1838	2090292.6739		MW-14	3
	276	611428.5085	2089600.3117			
	275	611344.1261	2089523.2188			
	274	611291.0676	2089481.6447			
	273	611203.6217	2089582.0119			
	272	611119.8154	2089643.6388			
	271	611157.9807	2089415.8650			
	280	611255.9620	2089573.6122			
	279	611330.4625	2089831.5148			
	278	611221.7409	2089894.6493			
	277	611409.6632	2090275.0250			
	284	611381.1919	2089948.8152			
	283	611339.6788	2089975.1260			
	282	611286.1756	2090012.2474			
	281	611354.6587	2090148.0883			
	285	611036.3043	2089688.3815			
	286	611121.2159	2089751.3281			
	288	611257.1539	2090076.6065			
	287	610995.1534	2089818.7720			
	298	611410.4210	2091360.4301			
	297	611713.7200	2091248.1725		MW-18	3-4
	296	611676.0341	2091241.2846		MW-18A	3-4
	299	610918.3391	2091245.4852			
	304	611185.3209	2091760.3659			
	303	611299.4316	2091223.1551			
	302	611321.6511	2091262.5895			
	301	611039.7085	2091216.9009			
	300	611191.9586	2091273.8912			
	305	610751.1716	2091073.2183		MW-15	4

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O'BRIEN & GERE
RARITAN CENTER, EDISON, N.J.
BORINGS

IN> LIST PTS 240 305

POINT TABLE

FIG #	PT #	NORTHING	EASTING	ELEVATION	IDENTITY	AREA
	270	611149.2627	2089283.6622			
	240	606827.9146	2088312.5454			
	241	607075.3488	2088589.9343			
	242	607978.3014	2088852.1310			
	243	612506.0524	2093907.7372			
	244	605966.8503	2089150.9888			
	245	611721.6210	2090667.8664			
	249	607641.1419	2087911.0333			
	248	607789.5663	2087715.4797			
	247	607767.8742	2087681.4255			
	246	607719.1841	2087573.5768			
	251	608011.6508	2087851.4453			
	252	608258.6837	2088169.3093			
	257	609897.5672	2089691.4079			
	256	609992.1259	2089988.8534		B-7	7
	255	610010.1875	2089986.7726		B-8	7
	254	609965.5221	2090394.6739			
	253	609572.3760	2090330.2793			
	258	610113.4861	2090309.9974			
	289	611451.9201	2090779.3243			
	290	611487.3679	2090970.6057			
	261	610591.1181	2090050.3755		B-11	2
	260	610665.9965	2090739.6912		B-14	3
	263	611084.4122	2090498.4029		B-15	3
	262	610968.2880	2090223.8139		B-13	3
	266	611222.6466	2091607.9747		B-22	4
	265	611272.0105	2091316.3183		B-20	4
	264	610943.0401	2091280.6411		B-19	4
	267	611480.4314	2091448.1266		B-21	4
	269	610967.8908	2090983.2398		B-18	3
	268	611308.9392	2090917.8773		B-17	3
	259	610406.1838	2090292.6739			
	276	611428.5085	2089600.3117			
	275	611344.1261	2089523.2188			
	274	611291.0676	2089481.6447			
	273	611203.6217	2089582.0119			
	272	611419.8154	2089643.6388			
	271	611157.9807	2089415.8650		B-10	2
	280	611255.9620	2089573.6122			
	279	611330.4625	2089831.5148		B-16	3
	278	611221.7409	2089894.6493			
	277	611409.6632	2090275.0250			
	284	611381.1919	2089948.8152			
	283	611339.6788	2089975.1260		B-12	3
	282	611286.1756	2090012.2474			
	281	611354.6587	2090148.0883			
	285	611036.3043	2089688.3815			
	286	611121.2159	2089751.3281			
	288	611257.1539	2090076.6065			
	287	610995.1534	2089818.7720			
	298	611410.4210	2091360.4301			
	297	611713.7200	2091248.1725			
	296	611676.0341	2091241.2846			
	299	610918.3391	2091245.4852			
	304	611185.3209	2091760.3659			
	303	611299.4316	2091223.1551			
	302	611321.6511	2091262.5695			
	301	611039.7085	2091216.9009			
	300	611191.9586	2091273.6912			
	305	610751.1716	2091073.2183			

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- 32
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SHALLOW SOIL SAMPLES

215 WESTFIELD AVENUE
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TELEPHONE 351-2100
AREA CODE 201

IN> LIST PTS 240 305

POINT TABLE

FIG #	PT #	NORTHING	EASTING	ELEVATION	IDENTITY	AREA
	270	611149.2627	2089283.6622			
	240	606827.9146	2088312.5454			
	241	607075.3488	2088589.9343			
	242	607978.3014	2088852.1310			
	243	612506.0524	2093907.7372			
	244	605966.8503	2089150.9888			
	245	611721.6210	2090667.8664			
	249	607641.1419	2087911.0333			
	248	607789.5663	2087715.4797		SS9-1 ✓	9
	247	607767.8742	2087681.4255		SS9-2 ✓	9
	246	607719.1841	2087573.5768		SS9-3 ✓	9
	251	608011.6508	2087851.4453			
	252	608258.6837	2088169.3093			
	257	609897.5672	2089691.4079			
	256	609992.1259	2089988.8534			
	255	610010.1875	2089986.7726			
	254	609965.5221	2090394.6739			
	253	609572.3760	2090330.2793			
	258	610113.4861	2090309.9974			
	289	611451.9201	2090779.3243		SS3-2 ✓	3
	290	611487.3679	2090970.6057		SS3-1 ✓	3
	261	610591.1181	2090050.3755			
	260	610665.9965	2090739.6912			
	263	611084.4122	2090498.4029			
	262	610968.2880	2090223.8139			
	266	611222.6466	2091607.9747			
	265	611272.0105	2091316.3183			
	264	610943.0401	2091280.6411			
	267	611480.4314	2091448.1266			
	269	610967.8908	2090983.2398			
	268	611308.9392	2090917.8773			
	259	610406.1838	2090292.6739			
	276	611428.5085	2089600.3117		SS2-1 ✓	2
	275	611344.1261	2089523.2188		SS2-2 ✓	2
	274	611291.0676	2089481.6447		SS2-3 ✓	2
	273	611203.6217	2089582.0119		SS2-5 ✓	2
	272	611119.8154	2089643.6388		SS2-6 ✓	2
	271	611157.9807	2089415.8650			
	280	611255.9620	2089573.6122			
	279	611330.4625	2089831.5148			
	278	611221.7409	2089894.6493		SS3-6 ✓	3
	277	611409.6632	2090275.0250		SS3-3 ✓	3
	284	611381.1919	2089948.8152			
	283	611339.6788	2089975.1260			
	282	611286.1756	2090012.2474		SS3-5 ✓	3
	281	611354.6587	2090148.0883		SS3-4 ✓	3
	285	611036.3043	2089688.3815		SS2-7	2
	286	611121.2159	2089751.3281		SS3-7	3
	288	611257.1539	2090076.6065			
	287	610995.1534	2089918.7720			
	298	611410.4210	2091360.4301		SS4-3 ✓	4
	297	611713.7200	2091248.1725			
	296	611676.0341	2091241.2846			
	299	610918.3391	2091245.4852		SS4-5 ✓	4
	304	611185.3209	2091760.3659			
	303	611299.4316	2091223.1551		SS4-1 ✓	4
	302	611321.6511	2091262.5895		SS4-2 ✓	4
	301	611039.7085	2091216.9009		SS4-4 ✓	4
	300	611191.9586	2091273.6912			
	305	610751.1716	2091073.2183			

SAILER & SAILER, INC.
PROFESSIONAL ENGINEERS & LAND SURVEYORS
PROFESSIONAL PLANNERS

215 WESTFIELD AVENUE
ELIZABETH, N. J. 07208
TELEPHONE 351-2100
AREA CODE 201

O'BRIEN & GERE
RARITAN CENTER EDISON, N.J.
AREA 15 COORDINATES

IN> LIST PTS 227 239

POINT TABLE

FIG #	PT #	NORTHING	EASTING	ELEVATION	IDENTITY	AREA STATUS
	227	613502.9779	2093829.2761		MW-36	15
	228	613600.3161	2094021.9141		MW-37	15
	237	613688.5552	2093501.6305		B-31	15
	236	613767.4774	2093606.6138		SS15-5	15
	235	613738.2451	2093632.8947		SS15-4	15
	234	613649.7317	2093642.2253		SS15-3	15
	233	613620.0462	2093675.0072		B-33	15
	232	613659.2573	2093691.9297		SS15-2	15
	231	613734.6094	2093742.3267		SS15-1	15
	230	613724.3075	2093837.8633		B-32	15
	229	613636.8983	2094008.8348		TRAV. PT.	15
	238	613917.1747	2093419.2255		MW-35	15
	239	613709.0367	2093513.7528		TRAV. PT.	15

May 1, 1989

RARITAN ARSENAL EDISON, N.J.
WELL BORING SAMPLE LOCATION
O'BRIEN & GERE

IN> LIST PTS 174 226

POINT TABLE

FIG #	PT #	NORTHING	EASTING	IDENTITY	AREA
	174	610754.2609	2091932.4105	SW-5	5
	175	610369.5251	2092742.8803	SW-4	5
	176	609725.7388	2091067.1697	SW-2	7
	177	609775.5995	2091058.5517	TRAV. PT.	4
	178	611256.2436	2091234.5088	SW-6	6
	179	609310.7171	2092996.9690	MW-34	6
	183	608126.7429	2094428.0503	B-30	6
	182	608279.0651	2094487.9516	MW-27	6
	181	608456.8076	2094219.3290	SS6-3	6
	180	609234.5888	2093143.6389	TRAV. PT.	6
	189	608506.1238	2094894.0896	B-29	6
	188	608251.2451	2094979.8943	B-28	6
	187	607941.4101	2095242.0047	MW-25	6
	186	607978.0182	2094889.0366	MW-16	6
	185	607970.1993	2094895.9613	MW-26	6
	184	608244.7050	2094573.7038	TRAV. PT.	6
	193	610725.6638	2091684.2881	MW-17	4
	192	610742.9841	2091511.6821	SS4-8	4
	191	610695.0230	2091413.7034	SS4-7	4
	190	610673.7954	2091353.3829	SS4-6	4
	194	610772.1768	2091715.7243	TRAV. PT.	4
	195	610651.8085	2092066.0232	MW-19	5
	196	610549.3133	2093046.1317	MW-22	5
	197	610723.4447	2092065.2838	TRAV PT.	5
	198	610668.9356	2092779.9781	TRAV. PT.	5
	201	610668.6528	2093231.3480	TRAV. PT.	5
	200	610023.1449	2093242.9065	MW-20	5
	199	609981.7705	2093061.4651	MW-21	5
	209	610373.8694	2087542.5237	MW-7	1
	208	610382.2537	2087548.6147	MW-31	1
	207	610439.7251	2087559.6127	MW-8	1
	206	610441.0796	2087572.5571	SS1-3	1
	205	610432.1236	2087579.6688	B-5	1
	204	610451.8172	2087630.2939	B-6	1
	203	610448.1702	2087631.0830	SS1-4	1
	202	610441.3243	2087632.8871	MW-9	1
	213	610326.7126	2087509.4974	SW-1	1
	212	610348.4153	2087492.8110	SS1-1	1
	211	610348.7356	2087484.6087	B-4	1
	210	610376.1152	2087530.1041	SS1-2	1
	214	610362.8169	2087529.3449	TRAV. PT.	1
	215	610244.4802	2087619.9175	TRAV. PT.	1
	221	604246.4798	2093363.1227	MW-30	11
	220	604270.0603	2093293.5479	SS11-1	11
	219	604370.7658	2093200.5728	MW-29	11
	218	604356.3538	2093298.7580	SS11-2	11
	217	604405.8000	2093468.9228	MW-28	11
	216	604432.5709	2093305.4366	SS11-3	11
	224	607726.4710	2087940.8848	B-3	9
	223	607578.4713	2087835.4055	B-2	9
	222	607428.2448	2087596.5737	B-1	9
	225	607565.4827	2086716.1599	MW-4	9
	226	608194.1181	2087502.6613	TRAV PT.	9

SAILER & SAILER, INC.
PROFESSIONAL ENGINEERS & LAND SURVEYORS
215 WESTFIELD AVENUE
ELIZABETH, N.J. 07208
PROFESSIONAL PLANNERS

APPENDIX D

GEOPHYSICAL DATA (MAGNETOMETER, EM)

Projects (continued) .....

(1)

Area # 11 9/14/88
Surveyors S. MAGEE, A. FRANCIS
Weather: SUNNY, 75°
BACKROUND KILOGAMMAS SET @ 56
54599
54706 } LOCATED IN ROAD
54943

INSTRUMENT: GEOMETRICS
G 816/826 A
MAGNETOMETER.

NEW BATTERIES INSTALLED PRIOR
TO BEGINNING OF SURVEY.

Thi
spe
a v

(2)

A #1	A #2	A #3	A 4	A 5	A 6
55097	54913	54936	54803	55085	54811
55103	54921	54935	54808	55079	54819
55103	54918	54935	54809	55078	54818
B #1	**B #2**	**B #3**	**B 4**	**B 5**	**B 6**
54755	54801	54870	54922	54949	54949
54754	54803	54871	54922	54951	54948
54755	54801	54872	54925	54951	54947
C #1	**C #2**	**C #3**	**C 4**	**C 5**	**C 6**
54910	54882	54911	54947	54961	54972
54913	54881	54910	54947	54961	54972
54913	54881	54910	54950	54961	54973
D #1	**D #2**	**D #3**	**D 4**	**D 5**	**D 6**
54970	54911	54938	54969	55001	54990
54968	54911	54937	54969	54974	54988
54967	54912	54936	54969	54972	54987

(5)

A 7	A 8	A 9	A 10	A 11	A 12
54896	54926	54905	54875	54871	54854
54899	54927	54907	54873	54871	54854
54895	54927	54894	54874	54871	54854
B 7	**B 8**	**B 9**	**B 10**	**B 11**	**B 12**
54946	54947	54934	54913	54907	54910
54946	54951	54934	54915	54908	54909
54947	54950	54936	54915	54907	54909
C 7	**C 8**	**C 9**	**C 10**	**C 11**	**C 12**
54964	54960	54954		54931	54943
54965	54960	54959	WATER	54934	54944
54964	54958	54958		54932	54944
D 7	**D 8**	**D 9**	**D 10**	**D 11**	**D 12**
54990	54990	54993		54960	54975
54989	54990	54992	WATER	54960	54976
54990	54989	54991		54960	54976

(4)

F"1	E"2	E"3	E4	E5	E6
54932	54934	54967	54989	54995	55013
54931	54935	54967	54989	54994	55013
54930	54933	54966	54988	54994	55013

F"1	F"2	F"3	F4	F5	F6
54877	54950	54981	55002	55005	55022
54875	54949	54979	55005	55005	55022
54876	54948	54979	55003	55005	55022

G"1	G"2	G"3	G4	G5	G6
55001	54992	55006	55021	55029	55040
55002	54990	55007	55020	55029	55039
55001	54990	55009	55019	55027	55040

H"1	H"2	H"3	H4	H5	H6
55105	55023	55028	55043	55043	55050
55103	55022	55028	55043	55044	55050
55102	55022	55028	55044	55044	55051

I"1	I"2	I"3	I4	I5	I6
55005	55033	55047	55057	55063	55063
55006	55034	55046	55058	55062	55064
55007	55034	55046	55058	55063	55064

(5)

E7	E8	E9	E10	E11	E12
55005	55000	55000		54983	54992
55005	55001	55004	WATER	54983	54992
55005	55001	55001		54983	54991

F7	F8	F9	F10	F11	F12
55019	55014	55021		55003	55014
55020	55012	55022	WATER	55001	55000
55021	55013	55022		55002	55001

G7	G8	G9	G10	G11	G12
55036	55039		55026	55017	55026
55035	55036	WATER	55034	55017	55026
55035	55037		55034	55017	55026

H7	H8	H9	H10	H11	H12
55059	55050		55042	55031	55043
55051	55050	WATER	55042	55031	55041
55051	55051		55041	55029	55043

I7	I8	I9	I10	I11	I12
55064	55068		55060	55042	55058
55063	55067	WATER	55060	55042	55056
55063	55067		55061	55041	55056

(6)

J#1	J#2	J#3	J4	J5	J6
55139	55053	55059	55068	55080	55073
55138	55053	55060	55068	55078	55073
55142	55054	55060	55070	55079	55071

K#1	K#2	K#3	K#4	K5	K6
55165	55058	55074	55083	55088	55077
55173	55058	55074	55082	55086	55077
55185	55058	55074	55084	55087	55076

L#1	L#2	L#3	L#4	L5	L6
55081	55070	55086	55097	55096	55092
55081	55072	55085	55095	55096	55091
55081	55072	55086	55095	55096	55093

M#1	M#2	M#3	M#4	M5	M6
55102	55119	55104	55109	55107	55104
55103	55120	55104	55109	55107	55095
55103	55120	55104	55111	55109	55094

(7)

J7	J8	J9	J10	J11	J12
55073	55082	WATER	55093	55072	55051
55074	55084		55092	55074	55073
55074	55084		55091	56879	55073

K7	K8	K9	K10	K11	K12
55084	WATER	55112	55123	55076	55081
55082		55113	55123	55074	55083
55083		55114	55123	55075	55081

L7	L8	L9	L10	L11	L12
55094	WATER	55191	55206	55069	55087
55094		55192	55211	55068	55087
55094		55191	55209	55068	55085

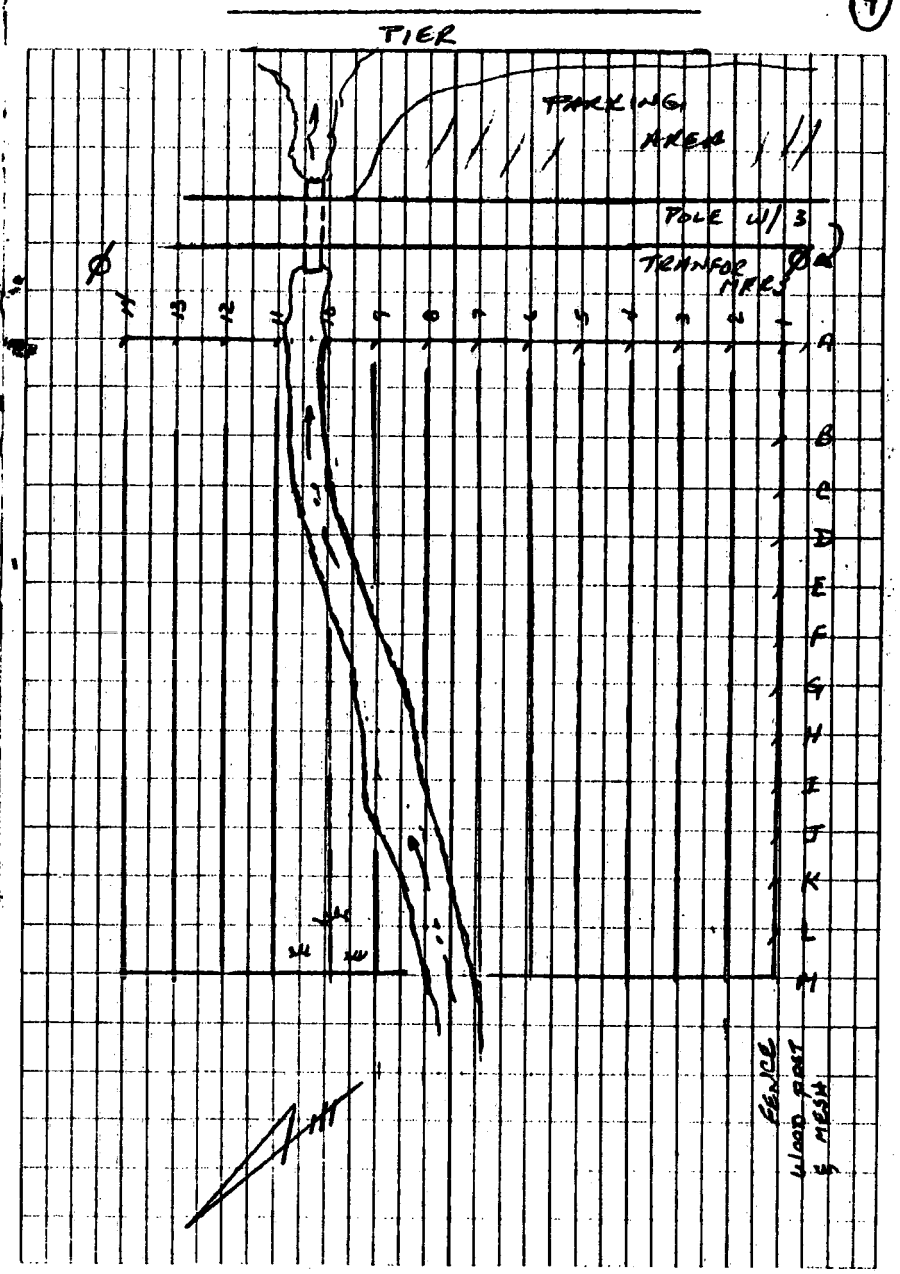
M7	M8	M9	M10	M11	M12
55100	55110	55101	55045	55061	55099
55100	55109	55103	55045	55064	55099
55101	55110	55103	55046	55062	55099

(8)

A13	F13	K13	A14	F14	K14
55834	55004	55088	54818	55001	55100
55833	55006	55089	54818	55002	55100
55833	55004	55089	54817	55004	55099
B13	G13	L13	B14	G14	L14
54888	55021	55096	54885	55014	55112
54889	55021	55097	54884	55012	55112
54890	55020	55098	54884	55014	55111
C13	H13	M13	C14	H14	M14
54900	55046	55111	54924	55036	55105
54925	55046	55113	54925	55035	55106
54925	55045	55112	54923	55034	55105
D13	I13		D14	I14	
54964	55060		54961	55053	
54964	55059		54961	55051	
54964	55059		54959	55052	
E13	J13		E14	J14	
54983	55074		54980	55052	
54984	55075		54979	55078	
54985	55074		54977	55076	

A Francis

(9)



(10)

AREA #1

LINE	0+00	0+25	0+50	0+75	1+00	1+25	1+50
#1	55097	55094	55094	55085	55043	55058	55045
	55098	55095	55093	55086	55071	55058	55047
	55097	55094	55094	55087	55075	55058	55046
#2	55104	55098	55087	55087	55080	55087	55044
	55104	55099	55087	55086	55079	55086	55044
	55110	55098	55085	55088	55080	55087	55046
#3	55101	55091	55099	55073	55058	55036	55023
(℄ CREEK)	55080	55091	55099	55076	55058	55037	55026
	55101	55091	55100	55074	55059	55038	55026
#4	55059	55072	55055	55043	55045	55008	54997
	55063	55066	55056	55043	55045	55008	54998
	55060	55070	55056	55045	55045	55008	54998
#5	54932	54965	54991	54988	54987	54936	54884
	54931	54965	54991	54989	54982	54935	54885
	54937	54965	54988	54991	54982	54936	54886
#6	54639	54906	56765	54573	54519	55184	54390
	54684	54820	54725	54373	54521	54563	54383
	54342	55246	54274	54415	54519	54880	54376

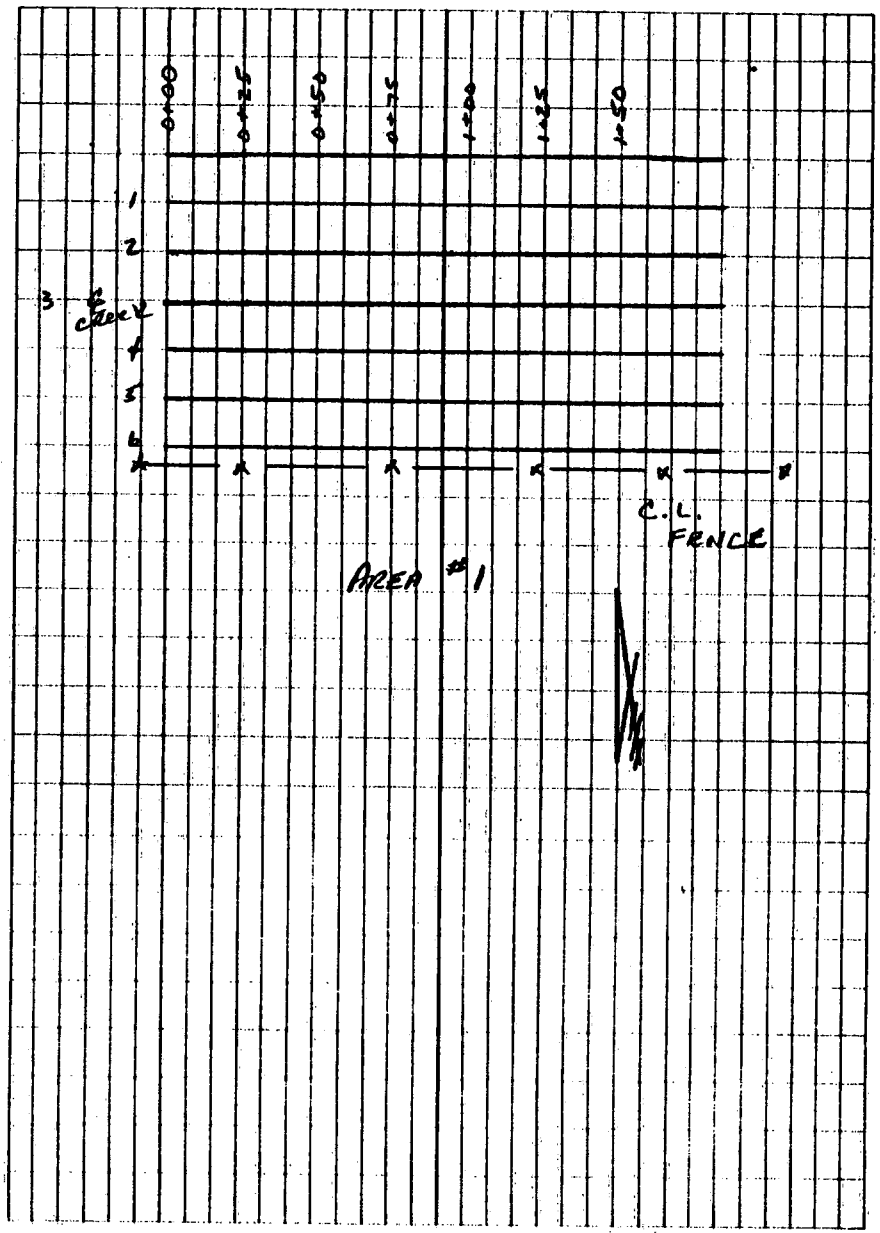
(11)

(SEE SKETCH PAGE 13)

A. Francois

(12)

(13)



(14)

(15)

AREA # 2 9/15/88

Surveyors : A. Francis S. Magee

Weather : Sunny, 75°

Background Readings 1 set
taken on Dirt Road inside
Area # 2.

54848
54847
54844
} Located in Dirt Road.

Instrument : Geometrics
G 81C/826H
Magnetometer

Tuning set @ 56 Kilogammas

Background	9/16/88	@ 10:00 am
10:00 am	1:10 pm	3:50 pm
55067	55054	55013
55068	55048	55013
55068	55047	55010

(16)

STA →	9+00	9+25	9+50	9+75	10+00
OFFSET ↓					
-275	℄ RAILROAD TRACK	℄ RAILROAD TRACK	53796	55064	54821
			53811	55065	54819
			53826	55054	54819
-250	55019	54983	54892	55037	54962
	55019	54983	54894	55032	54964
	55018	54982	54894	55038	54963
-225	55012	55012	55021	55007	55011
	55012	55014	55019	55006	55011
	55012	55013	55021	55008	55013
-200	55035	55029	55026	55027	55029
	55034	55027	55028	55026	55033
	55034	55029	55026	55026	55032
-175	55034	55041	55042	55040	55042
	55032	55041	55039	55037	55043
	55034	55042	55041	55038	55042
-150	55049	55047	55051	55050	55051
	55047	55047	55051	55048	55050
	55048	55050	55051	55049	55050

(17)

10+25	10+50	10+75	11+00
54776	55055	55161	55114
54771	55051	55157	55113
54773	55052	55160	55113
54976	55022	55049	55062
54977	55021	55051	55062
54977	55021	55050	55062
55022	55032	55044	55053
55021	55032	55043	55051
55021	55032	55045	55050
55033	55038	55043	55046
55036	55040	55043	55046
55035	55039	55045	55045
55044	55042	55043	55044
55043	55043	55044	55043
55045	55043	55044	55045
55049	55045	55038	55036
55044	55045	55037	55037
55048	55045	55036	55036

(18)

STA → / OFFSET ↓	9+00	9+25	9+50	9+75	10+00
-125	55053	55056	55049	55051	55054
	55052	55056	55052	55052	55053
	55052	55056	55053	55052	55055
-100	55067	55062	55061	55060	55055
	55062	55064	55061	55061	55056
	55061	55062	55063	55061	55056
-75	55079	55076	55076	55074	55071
	55076	55075	55075	55074	55073
	55076	55076	55074	55074	55073
-50	55083	55082	55090	55075	55074
	55081	55080	55089	55076	55073
	55083	55081	55089	55075	55074
-25	55085	55082	55084	55080	55080
	55086	55083	55083	55000	55080
	55085	55083	55083	55081	55240
℄	55086	55084	55083	55080	55078
	55086	55084	55083	55081	55080
	55088	55084	55082	55079	55080

(19)

10+25	10+50	10+75	11+00
55028	55027	54983	54961
55048	55028	54983	54985
55048	55030	54983	54985
55049	54987	55049	55095
55049	54984	55051	55095
55049	54985	55051	55097
55064	55047	55058	55055
55066	55045	55059	55058
55066	55047	55058	55058
55072	55065	55066	55063
55072	55067	55066	55064
55074	55067	55067	55063
55078	55073	55068	55057
55075	55072	55067	55057
55079	55072	55070	55057
55078	55074	55071	55073
55076	55074	55071	55073
55075	55075	55071	55072

STA →	9+00	9+25	9+50	9+75	10+00
OFFSET ↓					
+25	55085	55083	55084	55080	55078
	55085	55085	55083	55080	55078
	55086	55085	55084	55080	55077
+50	55085	55084	55081	55082	55085
	55085	55084	55082	55083	55084
	55086	55085	55084	55082	55085
+75	55072	55072	55069	55093	55084
	55072	55073	55068	55093	55083
	55072	55073	55069	55093	55084
1+00	55091	55088	55088	55081	55091
	55091	55088	55088	55082	55087
	55089	55089	55087	55081	55086
9/16/88					
1+25	55064	55062	55046	55052	55055
	55062	55062	55058	55054	55054
	55063	55063	55057	55054	55054
1+50	55055	55055	55051	55048	55092
	55056	55056	55051	55047	55092
	55056	55054	55053	55046	55089

10+25	10+50	10+75	11+00	
55070	55071	55073	55069	
55070	55071	55074	55069	
55070	55070	55073	55069	
55094	55075	55059	55083	
55095	55075	55059	55083	
55094	55077	55061	55083	
55080	55084	55088	55090	
55080	55085	55088	55091	
55080	55085	55087	55091	
55094	55060	55072	55067	
55087	55069	55071	55072	
55088	55064	55070	55073	
55046	55037	55036	55048	
55048	55041	55038	55048	
55047	55042	55040	55046	
55044	55083	55014	54909	GROUNDING WIRE & BURIED TELEPHONE POLE
55050	55081	55014	54900	
55049	55083	55013	54894	

(22)

STA →	9+00	9+25	9+50	9+75	10+00
OFFSET ↓					
1+75	55055	55044	55046	55044	55043
	55039	55047	55047	55027	55043
	55055	55052	55045	55032	55042
2+00	55021	55006	54986	55002	55016
	55015	55015	55006	55006	55009
	55009	55015	55004	55006	55018
2+25		RUNS PARALLEL TO R.C. PKWY			54899
					54911
					54910
					↳ LINE
2+50					

(23)

10+25	10+50	10+75	11+00	
UTILITY POLE				
55056	55047	55052	55026	
55057	55047	55052	55030	
55057	55047	55033	55027	
	WELLS 2			
55021	55004	55019	55060	NEAR GROUNDWORK WIRE & UTILITY POLES CUT UP.
55021	54995	55019	55062	
55020	55005	55013	55062	
54945	54982	54989	55000	
54943	54970	54987	55002	
54938	54964	54982	55004	
RUNS PARALLEL TO R.C. PARKWAY @ 30-50 FT.				
		54959		ON RARITAN C. PKWY CURB.
		54964		
		54956		

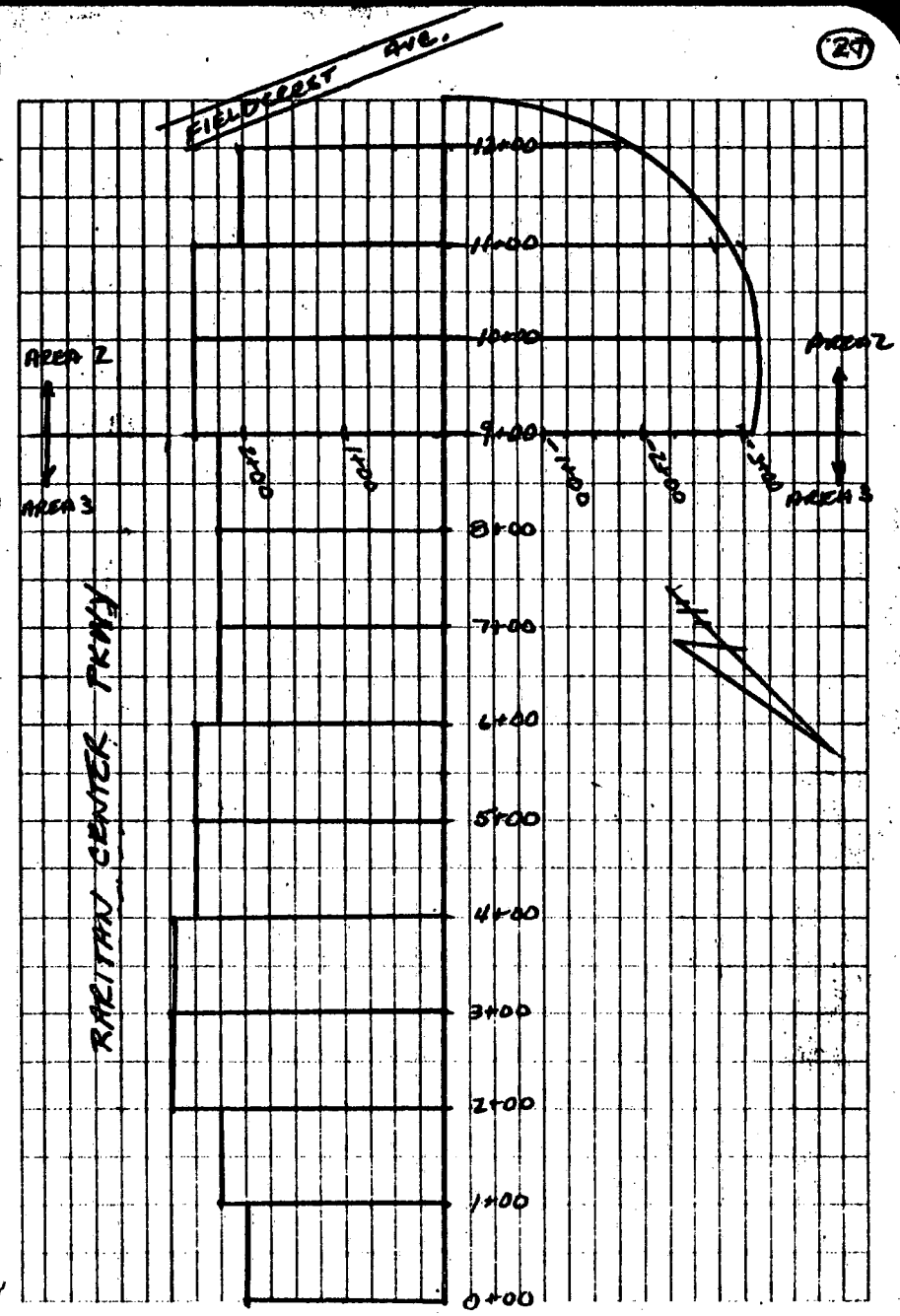
(24)

STA →	11+25	11+50	11+75	12+00	
OFFSET ↓					
-175	55048	55043	55039	55035	
	55048	55044	55040	55037	
	55049	55043	55038	55036	
-150	55030	55040	55038	55031	
	55029	55039	55036	55032	
	55030	55040	55037	55030	
-125	55106	54946	55055	55076	
	55105	54946	55054	55076	
	55103	54947	55056	55077	
	→ LINE	HAS GROUNDING	WIRE &	CUT POLES	
-100	55050	55080	55052	55028	
	55049	55080	55052	55027	
	55049	55080	55050	55025	
-75	55035	55049	55046	55054	
	55034	55049	55049	55053	
	55036	55048	55050	55053	
-50	55043	55033	55035	55052	
	55045	55032	55045	55052	
	55044	55034	55045	55051	

(25)

STA →	11+25	11+50	11+75	12+00
OFFSET ↓				
-25	55003	55010	55048	55044
	55006	55014	55048	55044
	55006	55012	55047	55045
	*	*		
B	55111	55153	55067	55054
	55104	55152	55068	55054
	55101	55152	55070	55055
+25	55086	55078	55058	55052
	55080	55078	55060	55060
	55087	55077	55061	55048
+50	55079	55047	55070	55055
	55078	55048	55071	55052
	55078	55047	55073	55054
+75	55063	55068	55039	55079
	55065	55067	55039	55077
	55065	55071	55028	55074
+100	55069	55067	55050	55038
	55068	55068	55060	55031
	55068	55067	55047	55035

STA →	11+25	11+50	11+75	12+00	
OFFSET ↓					
1+25	55058	55056	55049	55034	
	55058	55056	55054	55047	
	55068	55055	55054	55052	
1+50	55046	55053	55047	55038	
	56053	55051	55047	55033	
	55053	55053	55047	55032	
1+75	55036	55042	55040	54979	
	55037	55043	55037	54945	
	55036	55041	55040	55023	
2+00	54826	55008	55013	55003	
	54838	55008	55021	54997	
	54836	55007	55024	55004	
	POLES & WIRES				
2+25	55122	55058	54998	IN	
	55116	55059	54998	FIELDCREST AVE	
	55122	55039	55001		
	NEAR ROAD				
	END	OF	AREA	#2	
		A. Fraser			



9/22/88					
9:00 am	10:00 am	11:00 am	12:00 pm	1:00 pm	2:00 pm
54567	55315	55650	55346	55085	55085
54574	55453	55650	55203	55085	55085
54554	55514	55722	55578	55084	55085
				3:00 pm	4:00 pm
				55085	55084
				55088	55084
1:30 pm	2:30 pm	3:30 pm	4:30 pm	55086	55084
55085	55080	55054	55079		
55085	55081	55055	55079		
55085	55082	55054	55079		

9/19/88 Raritan Arsenal Area # 3

Surveyors: A. Francis
S. Magee

Background @ Island Loop N. of R.R.

10:00 am	12:00 pm	3:30 pm
55057	55073	55075
55062	55068	55074
55068	55068	55074

Weather: Sunny, Humid 80°-85°

Instrument: geoMetrics
G 816/826A Magnetometer
Tuning setting @ 56 Kilogrammmas

9/20/88	10:00 am	1:15 pm	4:00 pm
	55095	55099	55082
	55097	55098	55083
	55098	55100	55082

9/21/88	9:30 am	10:30 am	11:30 am	12:30 pm
	55063	55098	55084	55084
	55062	55084	55086	55083
	55060	55084	55083	55083

STA → / OFFSET ↓	0+00	0+25	0+50	0+75	1+00
0+00	55213	54331	55263	55650	54942
	55221	54268	55314	55657	54948
	55236 ON R.R.	54342 ON FENCE	55376 ON R.R. LINE	55662 ON R.R. LINE	54945 ON R.R. LINE
0+25	56035	56117	55104	55115	55115
	56170	57724	55221	55116	55114
	59502 ON C.L. FENCE	57918 ON RAIL ROAD	55198 ON RAIL ROAD	55116	55114
0+50	54660	56264	55428	55139	55095
	54621	56258	55417	55141	55095
	54675 NEAR R. ROAD	56268 R. ROAD RUBBLE	55434 UTIL. POLE CONC. RUBBLE	55142	55095
0+75	54820	55000	55102	55117	55093
	54816	54998	55091	55114	55097
	54825 R. ROAD RUBBLE	54996	55094	55115	55097
1+00	54997	55058	55083	55098	55097
	55008	55049	55084	55087	55098
	55009 NEAR R.C. PKWY.	55051	55082	55096	55098
1+25	55070	55050	55078	55074	55093
	55068	55013	55077	55086	55089
	55069 R.R. RUBBLE	55034	55076	55087	55089

1+25	1+50	1+75	2+00
55010	55083	55125	55117
55010	55036	55126	55117
55010	55037	55129	55117
55061	55075	55089	55089
55060	55073	55087	55088
55061	55074	55087	55085
55079	55086	55086	55087
55080	55086	55088	55088
55079	55085	55086	55088
55092	55087	55090	55088
55091	55088	55103	55091
55089	55089	55090	55091
55090	55094	55095	55093
55092	55094	55090	55092
55092	55094	55090	55094
55097	55092	55093	55092
55095	55093	55091	55091
55094	55093	55090	55092

STA →	℄ 0+00	0+25	0+50	0+75	1+00
OFFSET ↓					
1+50	55038	55053	55069	55080	55076
	55042	55052	55062	55080	55081
	54963	56041	55063	55055	55076
1+75	55000	55058	55065	55075	55091
	55029	55036	55074	55078	55090
	55018	55054	55042	55087	55090
	ON ROAD	NEAR RC. PKWY	NEAR G. WALL		
2+00					55039
	STA ℄ => 0+75 ON OR				55053
	ACROSS R. CENTER PKWY.				55051
2+25					55040
	STA ℄ => 0+75 ON OR				55040
	ACROSS R. CENTER PKWY.				55037

(CONT. pg 34)

1+25	1+50	1+75	2+00
55087	55089	55088	55089
55089	55089	55090	55089
55075	55090	55087	55089
55078	55083	55089	55090
55076	55079	55087	55090
55076	55085	55090	55081
55076	55074	55057	55070
55074	55077	55077	55070
55072	55072	55079	55071
55057	55056	55023	55073
55044	55060	55062	55074
55027	55059	55064	55072

STA → / OFFSET ↓	2+25	2+50	2+75	3+00	3+25
BL 0+00	55083	55071	55079	55084	55089
	55085	55072	55077	55083	55091
	55085	55071	55078	55084	55090
0+25	55093	55091	55089	55090	55091
	55093	55090	55090	55091	55090
	55094	55090	55090	55092	55090
0+50	55102	55098	55096	55095	55095
	55101	55098	55097	55093	55096
	55101	55098	55097	55095	55095
0+75	55103	55103	55100	55100	55097
	55103	55102	55101	55099	55098
	55104	55104	55101	55097	55097
1+00	55106	55103	55102	55102	55098
	55104	55103	55103	55101	55100
	55101	55104	55102	55101	55099
1+25	55104	55102	55105	55102	55102
	55104	55103	55104	55102	55101
	55105	55103	55106	55102	55102

3+50	3+75	4+00
55090	55087	55086
55089	55086	55086
55089	55086	55085
55092	55089	55091
55092	55090	55091
55093	55090	55090
55094	55095	55095
55096	55095	55093
55096	55095	55095
55096	55092	55094
55096	55093	55095
55096	55094	55096
55099	55098	55098
55098	55098	55095
55098	55098	55096
55100	55099	55098
55099	55099	55098
55099	55100	55098

STA → / OFFSET ↓	2+25	2+50	2+75	3+00	3+25
1+50	55097	55101	55093	55100	55098
	55098	55101	55097	55100	55099
	55097	55101	55100	55099	55100
1+75	55098	55093	55096	55096	55095
	55098	55098	55101	55097	55097
	55100	55097	55097	55096	55097
2+00	55093	55092	55087	55089	55090
	55093	55091	55090	55090	55085
	55093	55090	55084	55089	55078
2+25	55079	55084	55082	55085	55083
	55062	55083	55083	55086	55086
	55082	55082	55064	55085	55085
2+50	LINE	NOT	CLEARED		
2+75	LINE	NOT	CLEARED		

3+50	3+75	4+00
55102	55100	55099
55102	55100	55095
55102	55100	55098
55097	55093	55095
55097	55094	55095
55096	55096	55092
55084	55090	55087
55082	55088	55087
55086	55089	55086
55079	55082	55076
55081	55082	55078
55084	55082	55078
		55068
		55073
		55070
		55045
		55041
		55036

STA → / OFFSET ↓	4+25	4+50	4+75	5+00	5+25
0+00	55089	55088	55088	55083	55081
	55090	55089	55086	55083	55080
	55089	55089	55087	55083	55080
0+25	55081	55082	55080	55096	55072
	55082	55081	55081	55096	55072
	55082	55080	55079	55097	55072
0+50	55084	55083	55081	55078	55076
	55084	55083	55081	55078	55075
	55084	55085	55082	55079	55074
0+75	55085	55082	55080	55079	55077
	55085	55082	55081	55079	55077
	55085	55083	55079	55079	55077
1+00	55085	55083	55082	55079	55076
	55085	55084	55083	55080	55075
	55085	55085	55084	55081	55074
1+25	55087	55085	55084	55083	55077
	55087	55083	55084	55081	55076
	55086	55085	55085	55083	55077

5+50	5+75	6+00	
55077	55046	54941	
55078	55046	54942	
55078	55047	54941	
55102	55020	54334	
55103	55020	54326	
55102	55019	54324	
55028	55039	54938	
55031	55040	54939	
55031	55040	54940	
55078	55057	55052	
55077	55058	55053	
55077	55060	55053	
55072	55058	55062	
55073	55060	55062	
55072	55058	55061	
55064	55370	55240	NEAR FENCE
55064	55383	55237	
55064	55385	55236	

NEAR FENCE

(40)

STA →	4+25	4+50	4+75	5+00	5+25
OFFSET ↓					
1+50	55098	55097	55096	55092	55094
	55096	55097	55096	55093	55092
	55096	55097	55096	55094	55093
1+75	55090	55094	55092	55087	55082
	55087	55093	55091	55089	55087
	55093	55094	55092	55089	55067
					*
2+00	55085	55088	55068	55080	55112
	55090	55087	55085	55079	55169
	55089	55088	55086	55080	55171
2+25	55082	55079	55082	55078	
	55070	55085	55080	55085	NO
	55086	55085	55080	55084	
2+50				55064	NO
				55066	
				55063	
2+75				55026	
				55027	
				55006	

NOT R.C. PKNY

(41)

5+50	5+75	6+00
55089	55088	55083
55089	55089	55082
55087	55088	55082
55090	55084	55082
55089	55084	55081
55091	55087	55082
55080	55075	55085
55086	55068	55086
55086	55072	55086
		55080
LINE	CLEARED	55079
		55077
LINE		55062
CLEARED		55067
		55059
		ON
		R.C.
		PKNY

(42)

STA →	6+25	6+50	6+75	7+00	7+25
OFFSET ↓					
℄ 0+00	55066	55081	55087	55092	55092
	55066	55082	55088	55093	55091
	55068	55082	55087	55092	55090
0+25	55067	55086	55088	55088	55090
	55068	55086	55088	55089	55089
	55068	55085	55088	55089	55090
0+50	55078	55092	55093	55094	55093
	55077	55092	55093	55093	55092
	55076	55092	55093	55094	55093
9/21/88					
0+75	55090	55099	55090	55094	55089
	55089	55097	55090	55091	55089
	55089	55099	55090	55092	55090
1+00	55074	55090	55091	55089	55089
	55074	55090	55090	55089	55088
	55074	55090	55092	55090	55084
1+25	55111	55092	55087	55089	55087
	55105	55093	55088	55089	55084
	55105 NOISE FENCE	55095	55088	55088	55083

(43)

7+50	7+75	8+00	8+25	8+50	8+75
55091	55090	55091	55089	55087	55091
55090	55090	55090	55089	55087	55090
55092	55089	55090	55090	55089	55091
55091	55089	55089	55088	55089	55088
55090	55088	55090	55089	55089	55090
55090	55089	55088	55089	55089	55090
55080	55094	55090	55080	55083	55083
55090	55095	55089	55082	55084	55084
55090	55094	55090	55083	55084	55084
55089	55089	55089	55089	55086	55085
55090	55088	55089	55088	55083	55085
55090	55089	55087	55087	55084	55085
55087	55088	55089	55086	55085	55083
55087	55088	55088	55085	55086	55084
55088	55088	55087	55085	55086	55087
55086	55084	55083	55083	55082	55086
55085	55085	55081	55083	55084	55081
55085	55085	55078	55083	55081	55078

(14)

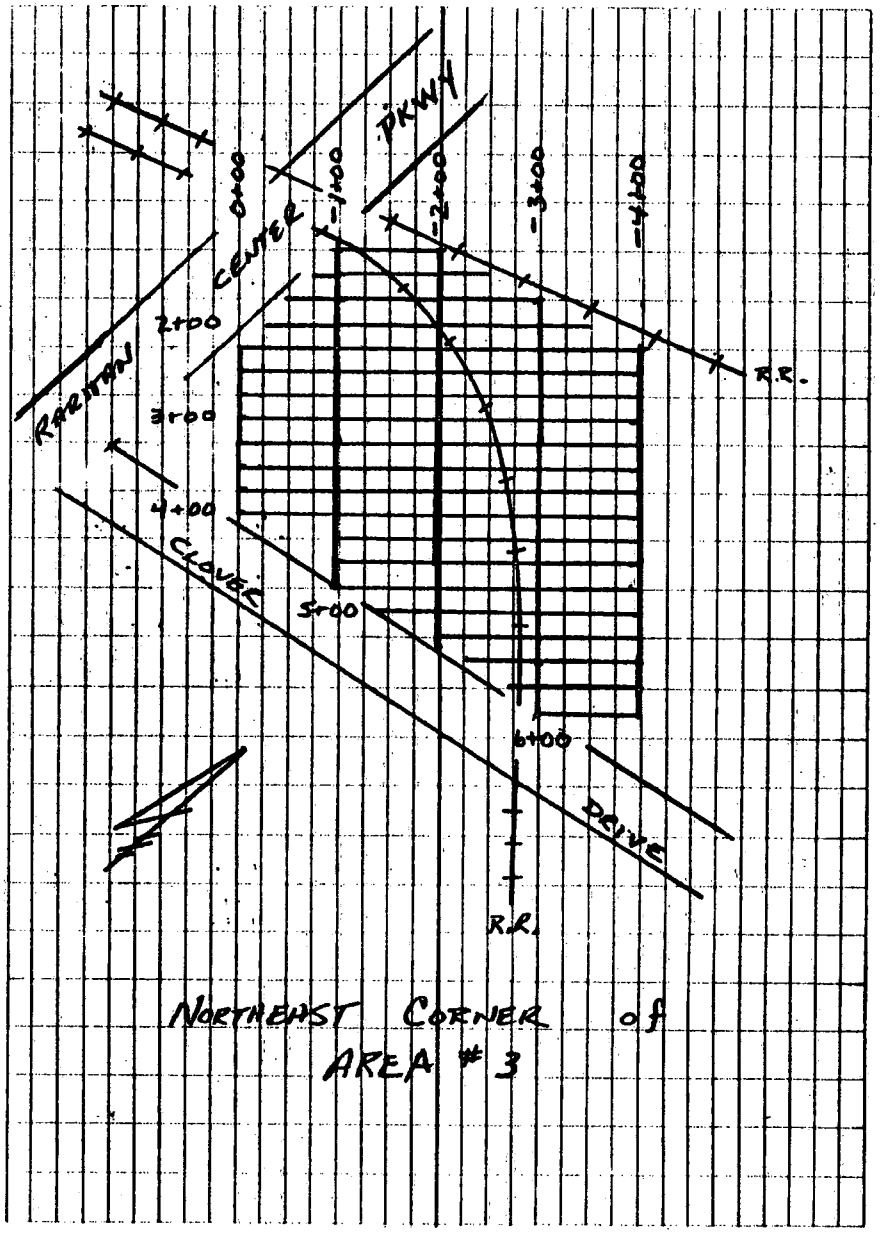
STA → / OFFSET ↓	6+25	6+50	6+75	7+00	7+25
1+50	55067	55072	55074	55077	55079
	55066	55070	55075	55077	55079
	55069	55072	55075	55076	55080
				*	
1+75	55086	55081	55066	55197	55075
	55083	55081	55066	55198	55062
	55086	55080	55054	55197	55072
2+00	55062	55065	55057	55062	
	55079	55069	55027	55063	NO
	55078	55070	55053	55065	
2+25				55039	
	NO LINE CLEARED			55040	
				55061	

END OF AREA #3

P. Francis

(14C)

7+50	7+75	8+00	8+25	8+50	8+75
55077	55079	55079	55073	55079	55088
55079	55072	55079	55073	55079	55090
55081	55058	55077	55073	55080	55091
55070	55068	55068	55067	55067	55063
55067	55069	55068	55060	55065	55066
55068	55065	55065	55038	55066	55064
		55050			
LINE	CLEARED	55051	NO	LINE	CLEARED
		55049			



NORTHEAST CORNER of
AREA # 3

(48)

STA → / OFFSET ↓	-1+00	-1+25	-1+50	-1+75	-2+00
1+25	ON RARITAN C. PKWY	ON RARITAN C. PKWY	ON RAIL ROAD	ON RAIL ROAD	55113
					55113
					55115 BET. RAIL LINES
1+50	ON RARITAN C. PKWY	ON RARITAN C. PKWY	54724	57382	55569
			54726	56067	55521
			54719 NEAR R.R.	56090 NEAR R.R.	55564 ON R.R.
1+75		54772	54894	54509	55264
		54866	54898	54532	54924
		54921 NEAR TELE M.H.	54909 ON R.R.	54478 ON R.R.	55519 ON R.R.
2+00	55077	55084	54991	54753	57777
	55063	55077	54983	54759	57782
	55042	55085	54991	54772 RAIL ROAD RUBBLE	57787 RAIL ROAD RUBBLE
2+25	LINE NOT CLEARED				

(49)

-2+25	-2+50	-2+75	-3+00	-3+25	-3+50
55030					
55029	ON RAILROAD TRACKS				
55052					
54465	55366	54691	55585		
54380	55362	54691	55584		
54452 ON R.R.	55353 RAIL ROAD RUBBLE	54691 R.R.	55931 RAIL ROAD		
55862	55113	55158	55170		
54290	55114	55162	55190		
55857 RAIL ROAD RUBBLE	55122 R.R.	55158 R.R.	55188 R.R.		
54825	56563	53960	55508	55233	55083
55025	56590	54007	55503	55236	54991
55091	56593	54099	55518	55232	54996
ALONG RAIL ROAD TRACKS					

STA → / OFFSET ↓	-2+00	-2+25	-2+50	-2+75	-3+00	-3+25	-3+50	-3+75	-4+00
2+50	60335	54387	58337	55160	55883	57510	55398	NOT	54275
	60219	54375	58778	55167	55868	57473	55370	CLEARED	54279
	60556	54374	58182	55173	55965	57452	55364		54275
	RAIL RUBBLE		℄ R.R.						NEAR FENCE
2+75	54967	54613	56656	56459	55542	53254	54679	55433	55018
	54884	54636	56631	56443	57941	53204	54679	55431	55016
	54860	54611	56601	56413	55838	53264	54667	55429	54998
	RAIL ROAD	RUBBLE	EDGE OF RAILS	EDGE OF R.R.					NEAR FENCE
3+00	54980	54837	57357	54937	54068	55352	54657	54823	55180
	54981	54853	57358	55603	53954	55442	54654	54814	55183
	54982	54838	57328	55542	54056	55442	54650	54790	55180
		MILD R.R.R.	EDGE R.R	EDGE R.R.					
3+25	55039	54322	54539	56612	55399	56357	55285	54931	55025
	55038	54306	54590	56689	55439	56197	55298	54930	55026
	55041	54314	54586	56573	55428	56225	55278	54930	55027
		RAIL ROAD RUBBLE	TRASH	R.R. ℄					
3+50	55066	55068	54828	54442	56833	55304	55359	54989	55056
	55066	55069	54826	54404	56822	55308	55367	54992	55040
	55066	55071	54825	54339	56814	55305	55342	54991	55041
			EDGE OF TRASH	EDGE R.R.					
3+75	55065	55253	55060	55897	56617	55288	55230	55044	55074
	55068	55246	55065	55901	56527	55288	55228	55043	55077
	55068	55259	55855	55902	56606	55287	55233	55042	55076
			TRASH	EDGE R.R.					

233 @ -400 (RAIL ROAD)

57419
57014
57087

(52)

STA →	-2+00	-2+25	-2+50	-2+75	-3+00
OFFSET ↓					
4+00	55076	55089	55112	55654	54770
	55076	55090	55112	55674	54772
	55075	55089	55113 Top of TRASH	55684 EDGE R.R.	54777 R.R. ℄
4+25	55070	55099	55127	54488	53006
	55071	55098	55136	54455	53037
	55070	55095 TRASH	55124	54438 EDGE R.R.	55409 R.R.
4+50	55151	55182	56639	54746	55766
	55153	55183	56652	54747	55766
	55051	55184	56644 R.R. RUBBLE	54751 EDGE R.R.	55761 RR
4+75	55003	55015	56006	54823	54371
	55004	55026	55856	54823	54241
	55005	55021	55854 R.R. (UNK) RUBBLE	54816 EDGE R.R.	54231
5+00	55003	54954	55255	55047	55216
	55007	54953	55209	55047	55155
	55004	54951 EDGE OF MHC	55188	55046	55145
5+25	54948	55029	54667	55084	55375
	54941	55052	54675	55085	55406
	54853 EDGE OF CLOVER RD.	55046 EDGE OF MRC	54675	55085	55398

(53)

-3+25	-3+50	-3+75	-4+00
55210	55127	55054	55103
55208	55133	55054	55103
55217	55133	55054	55102
54894	55080	55016	55078
54894	55080	55016	55077
54894 R.R.	55081	55015	55077
56032	55211	54987	55078
56052	55212	54988	55079
56178 R.R.	55209	54990	55078
54923	55230	54934	55068
54930	55227	54934	55068
54943 R.R.	55223	54942	55069
54809	55200	55024	55032
54778	55196	55025	55031
54774 R.R.	55196	55026	55032
56164	55167	55167	55079
56161	55172	55163	55079
56014 R.R.	55169	55159	55077

(54)

STA →	-2+00	-2+25	-2+50	-2+75	-3+00
OFFSET ↓					
5+50	ON CLOVER DRIVE	55477	54941	55026	54762
		55476	54992	55030	54708
		55476 EDGE OF CLOVER RD.	54992 CONC. RUBBLE	55029	54729
5+75	ON CLOVER DRIVE	ON CLOVER DR.	54962	54961	54968
			54960	54961	54969
			54969	54960 EDGE CLOVER DR.	54971
6+00					55170
	ON CLOVER	& CROSSING	DRIVE		55169
					55169

(55)

-3+25	-3+50	-3+75	-4+00
58161	55062	54978	54988
58583	55061	54977	54989
58076	55051	54976	54987
R.R.			
55063	54773	54999	54916
55038	54791	55001	54915
55061	54775	54999	54969
R.R.			
57875	55124	55232	55048
57391	55125	55183	55057
57127	55113	55234	55051

A. Francis

(56)

STA →	℄ 0+00	-0+25	-0+50	-0+75	-1+00
OFFSET ↓					
2+50	ON RARITAN CENTER PKWY		55000	55118	55188
			55051	55108	55182
			55067	55112	55190
			NEAR R.C. PKWY	NEAR R.R. RUBBLE	
2+75	55035	55035	55084	55067	55077
	55059	55034	55081	55069	55076
	55058	55032	55083	55067	55069
	NEAR R.C. PKWY				
3+00	55058	55050	55094	55066	55071
	55052	55059	55063	55067	55071
	55063	55041	55070	55065	55070
3+25	55048	55065	55070	55064	55068
	55056	55064	55072	55066	55069
	55059	55040	55071	55061	55066
3+50	55053	55065	55068	55065	55067
	55045	55060	55067	55067	55068
	55011	55061	55072	55066	55070
3+75	55047	55067	55065	55066	55077
	55061	55067	55067	55065	55077
	55058	55067	55067	55064	55076

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-1+25	-1+50	-1+75
54785	55080	55060
54765	55052	55056
54770	55054	55057
CONC. RUBBLE		
55053	55051	55051
55056	55051	55050
55057	55051	55053
55068	55062	55044
55068	55060	55039
55068	55061	55043
55069	55052	55053
55068	55060	55054
55068	55063	55054
55063	55050	55046
55063	55054	55044
55063	55056	55041
55073	55072	55066
55072	55070	55065
55072	55068	55062

(58)

STA → / OFFSET ↓	BL 0+00	-0+25	-0+50	-0+75	-1+00	-1+25	-1+50	-1+75
4+00	55047	55051	55056	55064	55073	55071	55068	55069
	55052	55056	55058	55057	55073	55072	55069	55068
	55052	55055	55058	55063	55072	55074	55068	55070
4+25	ON CLOVER DRIVE	55014	55032	55060	55066	55065	55063	55064
		55033	55031	55059	55065	55067	55063	55063
		55028	55022	55059	55065	55066	55063	55063
4+50			55029	55037	55046	55053	55058	55054
	ON CLOVER DRIVE		55029	55037	55024	55053	55059	55052
			55030	55033	55046	55053	55055	55052
4+75					54999	55073	55014	55035
	ON OR ACROSS CLOVER DR.				54998	55075	55014	55034
					55001 EDGE CLOVER DR.	55074	54990	55033
5+00							54993	55007
	ON OR ACROSS CLOVER DRIVE						55002	55006
							55002 EDGE CLOVER DR.	54996

END N.E. CORNER
AREA #3

A. Francis

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(60)

STA → / OFFSET ↓	1	2	3	4	5	6	7
0+00	55036	55052	55054	55061	55077	55080	55070
	55035	55052	55055	55061	55079	55079	55071
	55036	55051	55054	55063	55077	55079	55071
0+10	55032	55044	55055	55064	55069	55070	55070
	55032	55045	55056	55062	55069	55068	55070
	55033	55045	55056	55061	55069	55067	55070
0+20	55000	55048	55057	55063	55068	55068	55070
	55000	55046	55057	55062	55067	55068	55070
	55000	55046	55057	55063	55066	55069	55070
0+30	55048	55052	55061	55064	55076	55068	55071
	55048	55052	55060	55063	55076	55068	55070
	55049	55051	55061	55064	55075	55069	55070
0+40	55054	55054	55063	55085	55083	55075	55074
	55052	55055	55063	55084	55081	55076	55073
	55053	55056	55062	55085	55083	55076	55073
0+50	55051	55080	55083	55073	55078	55076	55067
	55051	55079	55085	55073	55077	55077	55068
	55052	55079	55081	55074	55077	55076	55068

(61)

STA →	1	2	3	4	5	6	7	
OFFSET ↓								
0+60	55059	55076	55075	55072	55077	55072	55056	
	55059	55075	55076	55073	55079	55073	55052	
	55060	55077	55075	55072	55078	55074	55056	
0+70	55075	55083	55083	55080	55079	55070	55069	
	55076	55082	55083	55079	55076	55072	55069	
	55076	55084	55083	55078	55077	55072	55070	
0+80	55065	55078	55084	55078	55074	55075	55092	
	55064	55079	55085	55078	55073	55075	55092	
	55063	55080	55082	55080	55073	55075	55090	
0+90	55059	55081	55081	55079	55083	55076	55107	
	55058	55080	55082	55079	55081	55076	55104	FENCE
	55061	55081	55083	55080	55081	55076	55103	
			*					
1+00	55067	55081	55079	55080	55082	55078	55153	
	55070	55079	56402	55081	55083	55084	55163	FENCE
	55069	55081	55079	55079	55082	55082	55160	
1+10	55076	55082	55079	55072	55077	55071	55226	FENCE
	55077	55082	55078	55076	55077	55069	55214	
	55077	55083	55078	55076	55076	55070	55219	

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STA → / OFFSET ↓	1	2	3	4	5
1+20	55101	55069	55045	55078	55081
	55105	55068	55046	55080	55082
	55104	55071	55047	55080	55082
	FENCE				
1+30	55112	55197	55146	55122	55120
	55110	55170	55152	55119	55114
	55110	55169 NOME FENCE	55145 NOME FENCE	55119 NEAR FENCE	55121 NOME FENCE

END OF FENCED AREA IN AREA #3

A. Francis

(65)

6	7	
55090	55103	
55091	55107	FENCE
55089	55089	
*		
55114	65080	
55109	55083	
55111	55083	

AREA #7 11/7/88 HOTSPOT LOCATED IN PARKING LOT OF PSE&G BLDG. RARITAN CENTER PKWY.

SURVEYORS: AFF, SAM A. Francis

INSTR.: - GEOMETRICS 11/7/88
G816/826A MAGNETOMETER
TUNING SET @ 56 KILOGAMMAS
WEATHER: SUNNY & WINDY TEMP. 55° F

STA → / OFFSET ↓	0+00	0+15	0+30
0+00	54496	54095	53876
	56563	56193	53787
	54494	54097	53784
	COR # 368		COR # 365
0+05	55010	54228	53896
	54935	54238	53903
	54931	54257	56596
0+10	54262	54246	53895
	54272	54216	53814
	54262	54240	53856

STA → / OFFSET ↓	0+00	0+15	0+30
0+15	53409	53859	56959
	53567	56176	53979
	54617	53849	53981
0+20	56056	56145	56324
	56229	55669	56345
	55411	53403	53981
0+25	56161	55634	54040
	53223	53495	54041
	53222	53480	56274
0+30	53731	53647	56488
	53594	53654	54060
	55992	53649	54060
0+35	53716	54031	56808
	53722	54019	54114
	55832	54034	54110
0+40	54806	54103	54161
	54906	54096	54165
	54856	54103	54164

COR # 367 COR # 366

BASE STA.
@ 5494Z 2004
54391
54399

BASE STA
@ 4:00 pm
54408
54396
54406

AREA #4 NW CORNER OF CLOVER & PONY FENCE

11/8/88

SURVEYORS : AFF, SAM

INSTR: GEOMETRICS G816/826A MAGNETOMETER

TUNING SET @ 56 KILOGAMMAS

WEATHER : SUNNY, SLIGHT BREEZE TEMP: 55° F

10:00 AM		1:00 pm			
BACKROUND		BACKROUND			
54901		55229			
54899		55231			
54900		55227			
STA →	0+00	0+50	1+00	1+50	2+00
OFFSET ↓					
0+00	54884	55124	55080	55117	54872
	54904	55118	55091	55111	54847
	54910	55146	55097	55111	54845
0+50	54883	55019	55017	55044	54909
	54900	55014	55012	55042	54913
	54895	55024	55013	55042	54916
1+00	54845	54930	54956	55038	54432
	54830	54943	54960	55037	54306
	54825	54945	54954	54994	53934

NEAR R.R. & TELEPHONE

2+50

57226
57246
57524
} NEAR R.R. TRACK & FENCE

60506
60233
60412
} NEAR R.R. TRACK FENCE

N.A.

STA → / OFFSET ↓	0100	0+50	1+00	1+50	2+00
1+50	54939	55012	55069	57417	55492
	54935	54956	55057	57414	55485
	54935	54965	55057	57445	55485
				NEAR R.R. RUBBLE & TRACKS	
2+00	54805	54873	54873	54611	57964
	54527	54867	54870	54609	57999
	54631	54863	54863	54613	57560
2+50	55385	55245	55186	54274	
	55555	55243	55188	54269	
	55107	55245	55184	54378	

NEAR R.R. TRACKS

A. Franco
11/8/88

2+50

N.A.

NEAR R.R. TRACKS

AREA #4 NW CORNER OF ALCOA BUILDING ON CLOVER AVE.

12/6/88

SURVEYORS: AFF SAM

INST: GEOMETRICS G 816/826A MAGNETOMETER, TUNING SET @ 56 KILOGAMMAS

WEATHER: OVERCAST, 40°F ± BREEZY.

STA → / OFFSET ↓	℄	0+50	0+81	1+50	2+00
0+00	53853	54363	54620	54767	54997
	53854	54366	54624	54767	54982
	53849	54360	54622	54770	54983
0+20	54294	54631	54701	54811	54916
TOE OF	54294	54633	54701	54812	54916
FILL	54294	54629	54701	54812	54916
0+50	54516	54656	54762	54736	54888
	54515	54659	54763	54734	54909
	54517	54656	54765	54734	54911
0+90	54219	54327	54786	54668	54528
TOE OF	54220	54331	54784	54655	54566
FILL ROAD	54220	54284	54785	54662	54573

BACKGROUND / ℄ 10:05 2nd

53853
53853
53853

2+50	
54935	
54932	
54931	
54914	
54905	
54909	
54625	
54686	
54684	
54713	HEAVY RUBBISH
57393	
60269	

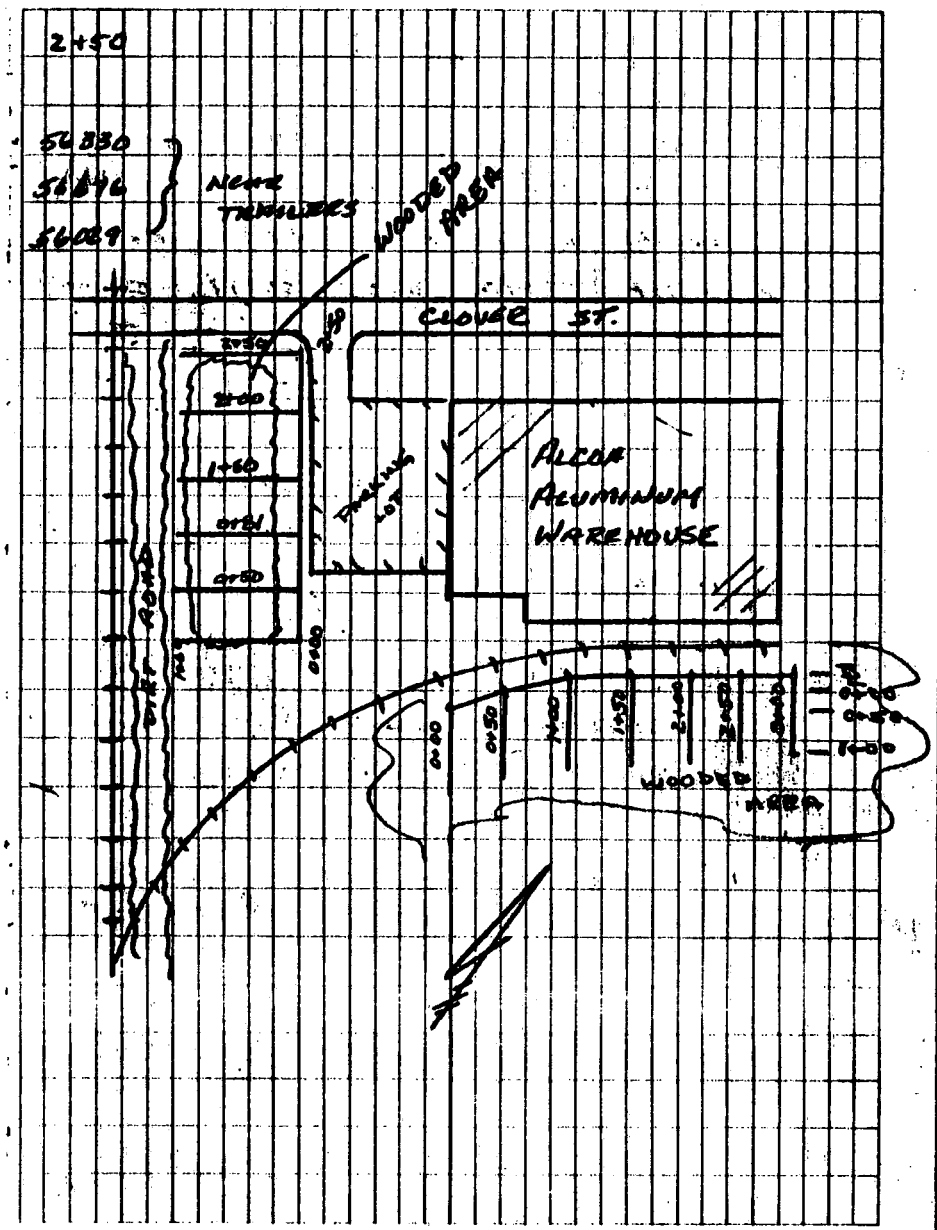
STN	0+00	0+50	0+81	1+80	2+00
OFFSET					
1+00	56720	53516	54908	54865	53363
	55684	53520	54908	52588	53205
	53520	53505	54909	55740	53290
	NEAR TRAILERS	NEAR TRAILERS	R.R. BUBBLE	R.R. & TRAILERS	NEAR TRAILERS

A. Francis
12/6/88

AREA #4 SE CORNER OF ALCOA WAREHOUSE
LOCATED ON CLOVER AVE.
12/6/88
SURVEYORS : AFF, SHM
INSTR: GEOMETRICS G816/826A MAGNETOMETER.
TUNING SET @ 56 KILOGAMMAS
WEATHER : SUNNY, 50°F BREEZY.

BASE STATION READINGS : 1:30 pm
53057
53432
53330

(SEE PAGE 76)



(76)

STA	0+00	0+50	1+00	1+50	2+00	2+50	3+00
OFFSET							
℄	54443	59860	58968	56372	56196	55184	53499
	57043	58996	58885	58030	55698	55294	53498
	58712	59370	59663	57983	56609	55775	53495
	NEAR R.R. CARS	NEAR R.R. CARS	NEAR R.R. CARS	NEAR R.R. CARS	NEAR R.R. CARS		
0+20	53834	55340	52790	56294	56000	53339	54408
TOE OF	53870	56389	55668	53487	53848	56120	54409
FILL	53851	56294	56169	53486	57731	53334	54467
0+50	54634	54591	54532	54440	54656	54704	54716
	54634	54590	54535	54438	54657	54710	54718
	54632	56872	54532	54434	54655	54710	54721
1+00	54828	54852	54849	54828	54849	54874	54900
	54826	54853	54849	54822	54852	54876	54898
	54827	54855	54848	54825	54851	54879	54898

NEAR C.L. FENCE

R Kramer
12/6

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(7B)

AREA #5 LOCATED SOUTH OF UPS BUILDING, 10' GRID.

12/7/88 SURVEYORS: AFF, SAM

INSTR: - GEOMETRICS G 816/826 A MAGNETOMETER TUNING SET @ 56 KILOGAMMAS

WEATHER: SUNNY 50°± F BREEZY.

STA → / OFFSET ↓	0+00	0+10	0+20	0+30	0+40
BL 0+00	54873	54862	55094	55077	54733
	54873	54863	55095	55077	54745
	54873	54866	55096	55076	54750
0+10	54992	54517	55510	55137	54253
	54962	54514	55494	55150	54257
	54986	54515	55500	55153	54269
0+20	54913	54942	54987	55043	65039
	54891	54943	54990	55042	55031
	54872	54945	54988	55043	55031
0+30	54874	55975	55005	55029	55045
	54892	55675	55002	55029	55043
	54866	55673 NOISE FENCE	55003	55030	55044

(7A)

12/7

	10:60?m	12:00	3:30
BACKGROUND:	55014	55095	55073
	55015	55095	55072
	55019	55095	55073

12/8 BACKGROUND: 11:00?m 2:20

	55493	55023
	55041	55085
	55087	55079

0+50	0+60	0+70	0+80	0+90	1+00
57871	55107	55486	54716	55128	55404
58229	55107	54936	54762	55128	55281
60263 NEAR FENCE	55109	55219	54735	55126 NEAR FENCE	54788
57105	55001	54925	54841	55080	54962
57090	55001	54924	54832	55082	54964
57757	54999	54923	54833	55082	54965
54965	55033	55013	55077	55093	55180
54964	55032	55011	55075	55090	55151
54963	55032	55011	55076	55088	55147
55030	55035	54931	55342	55090	55314
55033	55035	54930	55344	55089	55312
55032	55036	54933	55343	55091	55314

STA → / OFFSET ↓	0+00	0+10	0+20	0+30	0+40
0+40	54941	54994	55036	55056	55066
	54987	54948	55035	55056	55062
	54991	54953	55034	55054	55064
0+50	55034	55018	55033	55040	55064
	55039	55018	55039	55041	55063
	55042	55016	55038	55042	55067
0+60	55030	55081	55102	55118	55126
	55037	55083	55101	55121	55127
	55041	56083	55101	55122	55136
0+70	55067	55098	55118	55113	55135
	55081	55102	55120	55118	55128
	55077	55100	55120	55117	55132
0+80	55147	55143	55093	55105	55103
	55113	55149	55105	55104	55104
	55177	55147	55102	55104	55105
0+90	55141	55119	55133	55130	55120
	55152	55164	55127	55129	55111
	55157	55118	55114	55130	55127

0+50	0+60	0+70	0+80	0+90	1+00
55045	55058	55045	55119	55097	55069
55066	55057	55045	55119	55100	55068
55064	55056	55040	55120	55100	55075
55066	55063	55056	55046	55058	55068
55067	55062	55063	55066	55067	55068
55067	55062	55064	55065	55067	55067
55125	55132	55124	55125	55133	55132
55127	55129	55125	55130	55128	55135
55141	55132	55127	55131	55129	55136
55148	55145	56864	55136	55171	55160
55149	55144	56864	55136	55148	55157
55146	55142	56864	55138	55170	55161
55100	55110	55117	55120	55121	55125
55100	55112	55115	55123	55123	55122
55102	55113	55114	55122	55124	55121
55116	56803	55144	55142	55241	57397
55118	56803	55143	55143	56243	56763
55117	56850	55145	55142	55241	55174

STA → / OFFSET ↓	0+00	0+10	0+20	0+30	0+40
1+00	55151	55087	55067	55061	55017
	55142	55076	55070	55064	55009
	55144	55082	55077	55068	55024
1+10	55142	55049	55049	55048	55004
	55120	55050	57117	55050	55001
	55111	55049	57096	55049	55003
1+20	55155	55172	54995	54846	54849
	55142	55116	54841	54861	54859
	66174	55158	54861	54851	54869
1+30	55114	55256	55358	55425	55487
	55121	55265	55204	55353	55400
	55112	55260	55210	55359	55503
1+40	55146	54963	55112	54977	55036
	55141	54981	55101	55017	55047
	55127	54969	55096	55027	55055
1+50	55097	54841	54898	54898	54923
	55136	54891	54873	54874	54938
	55141	54843	54916	54846	54881

0+50	0+60	0+70	0+80	0+90	1+00
54960	55048	55073	55072	55091	55092
54964	55057	55073	55080	55087	55089
54960	55059	55078	55092	55090	55089
55013	55044	55055	55072	55083	55059
55005	55053	55050	55071	55085	55070
55005	55036	55056	55069	55088	55066
54848	54863	54853	54897	54879	54911
54842	54871	54872	54889	54908	54922
54844	54861	54883	54883	54917	54911
55050	55146	55387	55279	55488	55479
55115	55157	55410	55469	55495	55478
58970	55195	55455	55402	55573	55555
54986	55006	55111	55000	54988	55467
55018	55082	55157	55037	55058	53105
55018	55082	55160	55027	54951	53131
55093	55425	55575	55603	55443	53737
55046	55264	55262	55606	55430	55714
55081	55264	55253	55572	55529	55281

STA →	0+00	0+10	0+20	0+30	0+40
OFFSET ↓					
1+60	55076	54830	54840	54864	54843
	55091	54852	54817	54863	54846
	55102	54897	54838	54856	54858
1+70	55020	54802	55078	55132	55144
	55002	54905	55072	55132	55137
	55007	54930	55055	55117	55131
1+80	55030	54833	54828	54857	54852
	55035	54845	54833	54844	54852
	55039	54826	54835	54853	54838
1+90	55070	55786	55045	55091	55103
	55097	54854	55067	55114	55100
	55122	54858	55006	55098	55104

0+50	0+60	0+70	0+80	0+90	1+00
54735	54869	55249	55182	55457	55610
54742	54862	55278	55201	55544	55620
54752	54845	55237	55209	55615	55512
56020	55150	55454	55456	55317	55423
55031	55161	55491	55707	55577	55553
55024	55154	55429	55467	55439	55677
54855	54877	55626	54916	55570	55548
54844	54834	55637	54920	55579	55513
54859	54891	55596	54935	55527	55477
55463	55511	55462	55327	55464	55677
55437	55478	55401	55480	55518	55576
55466	55439	55508	55444	55405	55587

STA → / OFFSET ↓	1+10	1+20	1+30	1+40	1+50
℄ 0+00	55106	55222	55038	55072	54981
	55015	55218	55039	55017	54982
	55077	55218	55038	54921	54978
0+10	54972	55206	55050	54912	55046
	54971	55203	55058	54908	55045
	54975	55208	55062	54911	55044
0+20	55076	55110	55068	55097	55094
	55070	55109	55066	55093	55094
	55069	55108	55066	55094	55094
0+30	55610	55316	55092	55081	55076
	55613	55318	55096	55072	55076
	55620	55318 FOUNDATION Remains	55096	55071	55073
0+40	55125	55191	55081	55110	55099
	55121	55089	55078	55094	55097
	55123	55082	55079	55093	55099
0+50	55062	55080	55080	55084	55066
	55064	55080	55082	55079	55082
	55067	55080	55079	55085	55076

1+60	1+70	1+80	1+90	2+00
54230	55110	55042	55002	55042
54984	55113	55040	55002	55047
54979	55117	55042	55002	55045
55064	55104	55092	55087	55122
55062	55109	55097	55085	55124
55065	55107	55095	55083	55118
55096	55092	55101	55116	55106
55095	55090	55099	55116	55105
55095	55089	55098	55116	55106
55024	54644	54999	55053	55062
55028	54651	55000	55052	55064
55027	54658	55000	55052	55068
55099	54983	55022	55057	55095
55099	54980	55019	55058	55094
55102	54990	55016	55045	55096
55191	55102	55063	55056	55125
55091	55104	55070	55068	55123
55090	55107	55069	55065	55123

STA → / OFFSET ↓	1+10	1+20	1+30	1+40	1+60
0+60	55108	55157	55138	55132	55131
	55106	55157	55140	55134	55130
	55107	55158	55140	55134	55131
0+70	55149	55154	55175	55170	55166
	55148	55153	55177	55171	55163
	55145	55149	55177	55169	55166
0+80	55115	55138	55134	55129	55129
	55110	55135	55136	55128	55127
	55110	55136	55136	55129	55130
0+90	55136	55135	55156	55164	55154
	55145	55154	55153	55164	55154
	55144	55153	55159	55163	55153
1+00	55071	55060	55075	55059	55070
	55069	55067	55070	55061	55070
	55096	55068	55072	55066	55072
1+10	55070	55075	55078	55080	55075
	55068	55074	55074	55079	55074
	55068	55074	55073	55077	55084

1+60	1+70	1+80	1+90	2+00
55132	55177	55112	55091	55198
55181	55178	55114	55095	55195
55181	55176	55112	55105	55196
55187	55181	55164	55233	55178
55187	55184	55140	55227	55177
55187	55182	55128	55228	55179
55133	55123	55140	55155	55167
55135	55128	55142	55157	55157
55133	55127	55144	55157	55171
56747	55154	55153	55122	55198
56856	55150	55149	55124	55199
56756	55154	55177	55129	55201
55075	55077	55066	55060	55062
55080	55080	55067	55061	55045
55079	55077	55070	55063	55039
55073	55083	55083	55083	55064
55076	55079	55079	55083	55062
55075	55082	55077	55084	55061

STA →	1+10	1+20	1+30	1+40	1+50
OFFSET ↓					
1+20	54914	54937	54914	54948	54922
	54904	54920	54932	54967	54956
	54927	54967	54942	54981	54952
1+30	55525	55581	55423	55479	55516
	55481	55441	55439	55627	55521
	55492	55501	55615	55589	55506
1+40	54964	55155	54980	55020	54975
	54989	55018	54987	55026	55064
	54996	55025	54998	55033	55047
1+50	55664	55480	55374	55281	55926
	55612	55439	55385	55540	55814
	55339	55334	55661	55557	55669
1+60	54915	54899	54881	54826	55140
	54900	54895	54878	54816	55150
	54904	54900	54876	54819	55155
1+70	55358	55480	55241	55528	55531
	55464	55504	55231	55624	55606
	55387	55506	55253	55458	55563

1+60	1+70	1+80	1+90	2+00
54951	54928	54947	54931	54918
54946	54964	54940	54924	54908
54955	54961	54950	54928	54904
55444	55604	55611	55574	55643
55550	55544	55652	55711	55587
55488	55529	55576	55790	55502
54982	54977	55048	55088	55086
54994	55028	55049	55076	55154
56004	55053	55066	56017	55145
55800	55320	55312	55430	55436
55498	55373	55476	55840	55847
55556	55644	55644	55451	55831
55115	55961	56040	54978	54983
55073	55103	55046	54964	55026
55085	55087	55063	54985	55023
55583	55747	55716	55707	55514
55570	56411	55582	55593	55759
55541	55564	55624	55504	55780

STA → / OFFSET ↓	1+10	1+20	1+30	1+40	1+50
1+80	54880	54923	54833	54546	54883
	54881	54918	54840	58235	54854
	54872	54907	54832	54845	54865
1+90	55113	55158	55137	55414	55385
	55111	55181	55128	54593	55471
	55115	55172	55123	54973	55455

1+60	1+70	1+80	1+90	2+00
54905	54907	54931	54960	54951
54914	54891	54939	54938	54942
54914	54919	54939	54926	54925
55397	55479	55312	55512	54915
55498	55506	55579	55571	54937
55530	55473	55606	55452	56051

STA →	2+10	2+20	2+30	2+40	2+50
OFFSET ↓					
0+00	55162	55086	55060	54949	54944
	55158	55088	55060	54952	54945
	55159	55090	55060	54948	54946
0+10	55125	55072	55065	55021	55014
	55125	55076	55066	55022	55014
	55126	55077	55060	55023	55015
0+20	55110	55117	55109	55105	55072
	55108	55118	55107	55102	55078
	55107	55115	55108	55102	55077
0+30	55042	55148	55110	55093	55087
	55047	55148	55107	55091	55081
	55045	55150	55108	55090	55081
0+40	56031	55099	54995	55053	55119
	55111	55098	54997	55052	55117
	55112	55095	54998	55055	55118
0+50	55129	55142	55116	55109	55106
	55131	55143	55119	55111	55094
	55134	55142	55118	55108	55094

2+60	2+70	2+80
54957	55052	54982
54960	55016	54988
54956	55016	54972
55033	55051	54979
55037	55026	54977
55038	55020	54977
55129	55113	55063
55127	55119	55063
55126	55122	55065
55081	55038	55040
55090	55035	55041
55088	55035	55043
55148	55160	55097
55139	55160	55095
55141	55164	55092
55083	55076	52955
55086	55079	55070
55090	55078	55063

STA →	2+10	2+20	2+30	2+40	2+50
OFFSET ↓					
0+60	55162	53764	55154	55137	55141
	55160	55165	55153	55137	55138
	55164	55166	55154	55186	55186
0+70	55196	55181	55247	55187	55174
	55195	55179	55250	55187	55177
	55190	55184	55253	55189	55177
0+80	55092	55163	55170	55159	55154
	55091	55157	55169	55156	55151
	55095	55178	55168	55157	55162
0+90	55162	55164	55168	55183	55167
	55166	55155	55165	55181	55169
	55161	55145	55169	55184	55167
1+00	55049	55091	55088	55199	55092
	55053	55090	55106	55200	55094
	55057	55093	55094	55201	55092
1+10	56873	55132	55362	55193	55096
	55021	55133	55366	55195	55096
	55020	55136	55082	55196	55095

2+60	2+70	2+80
55139	55124	55142
55138	56713	55147
55140	56713	55149
55168	55172	55145
55169	55174	55143
55178	55173	55140
55153	55150	55051
55152	55154	55042
55150	55150	55049
55170	55112	55197
55161	55165	55198
55162	55113	55194
55078	55070	55048
55079	55068	55049
55078	55071	55050
55083	55060	55057
55077	55081	55060
55077	55081	55084

STA → / OFFSET ↓	2+10	2+20	2+30	2+40	2+50
1+20	54941	54954	54903	55104	54954
	54971	54977	54947	55101	54980
	55013	54967	54909	55112	54974
1+30	55617	55515	55554	55927	55539
	55591	55548	55505	55688	55626
	55435	55544	55465	55726	55549
1+40	55009	55061	55056	55050	55210
	55004	55075	55088	55058	55051
	55060	55088	55089	55068	54984
1+50	55480	55297	55339	55833	55966
	55588	55413	55484	55842	55637
	55713	55407	55738	55695	55772
1+60	54927	54914	54997	55194	54979
	54945	54913	55004	55076	54998
	54945	54929	54997	55067	55039
1+70	55516	55518	55617	55557	55551
	55537	55604	55619	55520	55545
	55584	55496	55551	55504	55571

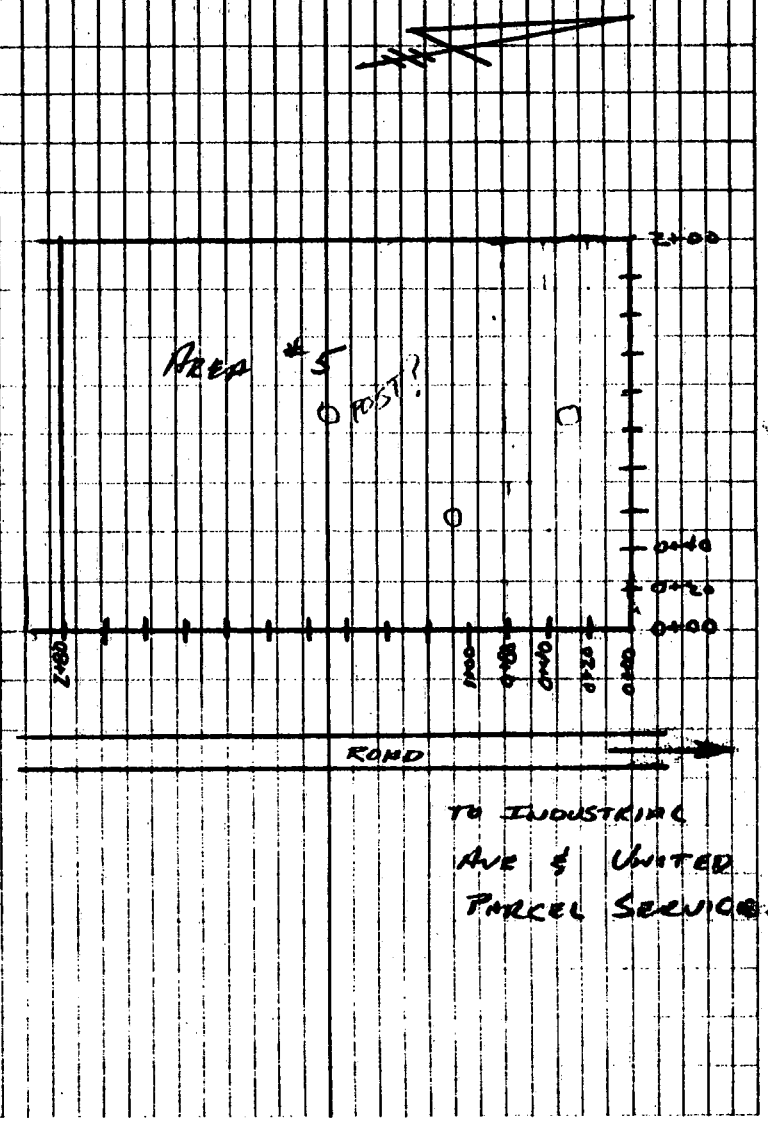
2+60	2+70	2+80
54961	54914	54895
54956	54932	54903
54960	54929	54908
55552	55440	55643
55526	55586	55600
55570	55597	55553
55048	55713	55040
55042	55599	55034
55054	55151	55035
55927	55464	55555
55787	55886	55643
55411	55746	55432
55228	55915	55387
55017	55599	55642
55770	55587	55541
55637	55854	55632
55637	55651	55632
55456	55439	55573

STA → / OFFSET ↓	2+10	2+20	2+30	2+40	2+50
1+80	54973	54926	54892	54951	54942
	54974	54937	54932	54963	54954
	54948	54932	54932	54980	54954
1+90	55518	55647	55530	55468	55631
	55524	55553	55649	55657	65601
	55525	55470	55610	55562	55479

2+60	2+70	2+80
54924	54956	55238
54940	54942	55374
54945	54965	55484
55577	55486	55443
55609	55523	55485
55633	55646	56525

A. Francis
12/8/88

12/8/88


2+00
AREA #5
POST?
0+40
0+20
0+00
ROAD
TO INDUSTRIAL
AVE & UNITED
PARCEL SERVICE

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Area 5 Em

STA → / OFFSET ↓	0+00	0+10	0+20	0+30	0+40
			NEAR BUSHES	NEAR BUSHES	
0+00	1.5	1.7	2.4	30	1.7
0+10					
0+20	1.5	NEAR FENCE 64	2.3	1.8	1.6
0+30					
0+40					
0+50	1.3	1.3	1.3	1.2	1.3
0+60					
0+70					
0+80	1.8	1.4	1.4	1.3	1.3
0+90					
1+00					
1+10	1.2	1.6	1.4	1.3	1.3
1+20					
1+30					
1+40	NEAR FENCE 1.7	1.6	1.4	1.4	1.4
1+50					
1+60					
1+70					
1+80	60 NEAR FENCE	2.3	1.6	1.5	1.5
1+90					

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0+50	0+60	0+70	0+80	0+90	1+00
1.5	1.7	1.5	1.5	1.4	1.2
1.5	1.7	1.4	1.2	1.3	1.2
1.2	1.2	1.2	1.0	1.1	1.1
1.2	1.1	1.2	1.3	1.2	0.7
1.3	1.3	1.3	1.3	1.3	1.3
1.4	1.3	1.3	1.3	1.4	1.3
1.6	1.4	1.6	1.5	1.4	1.4

STA →	1+10	1+20	1+30	1+40	1+50
OFFSET					
0+00	1.2	1.2	1.2	1.3	1.3
0+10					
0+20	1.2	1.2	1.3	1.3	1.1
0+30					
0+40					
0+50	1.2	2.3	1.5	1.4	1.4
0+60					
0+70					
0+80	1.2	1.2	1.1	1.2	1.1
0+90					
1+00					
1+10	1.2	1.2	1.1	1.2	1.2
1+20					
1+30					
1+40	1.3	1.3	1.3	1.2	1.2
1+50					
1+60					
1+70					
1+80	1.4	1.4	1.4	1.4	1.4
1+90					

1+60	1+70	1+80	1+90	2+00
1.4	1.4	1.5	1.5	1.5
1.2	1.2	1.1	1.3	1.4
1.4	1.3	1.3	1.3	1.3
1.1	1.1	1.1	1.1	1.1
1.1	1.2	1.2	1.2	1.2
1.2	1.2	1.2	1.2	1.2
1.3	1.3	1.2	1.3	1.3

STA → / OFFSET ↓	2+10	2+20	2+30	2+40	2+50
0+00	1.5	1.6	1.5	1.4	1.6
0+10					
0+20	1.1	1.2	1.2	1.2	1.3
0+30					
0+40	1.1	1.1	1.1	1.1	1.2
0+50					
0+60					
0+70					
0+80	1.1	1.1	1.1	1.1	1.1
0+90					
1+00					
1+10	1.2	1.2	1.2	1.2	1.2
1+20					
1+30					
1+40	1.2	1.2	1.0	1.2	1.2
1+50					
1+60					
1+70					
1+80	1.3	1.3	1.3	1.3	1.4
1+90					

2+60	2+70	2+80	
1.2	1.3	1.4	
1.5	1.3	1.4	
1.2	1.3	1.5	
1.2	1.2	1.3	
1.2	1.2	1.2	
1.2	1.4	17	NEAR FENCE
1.4 NEAR METAL BAR	2.0	96	NEAR FENCE

AREA #15 MAG SURVEY 3/20/89

SURVEYORS : AFF/ARH

INST : - GEOMETRICS G816/026A9

TUNING SET @ 56 KILOGAMMAS

WEATHER : SUNNY, 45°

LOCATION : - LLYODS WAREHOUSE

STN	0+00	0+25	0+50	0+75	1+00
OFFSET					
0+00	54138	54608	54933	55025	54930
	54161	54602	54931	55024	54932
	54161 NEAR R.R.	54605 NEAR R.R.	54931	55029	54932
0+25	54152	54803	55799	54819	54982
	54156	54804	55779	54816	54983
	54156 NEAR R.R.	54801	55788	54813	54982
0+50	54155	54644	55070	55019	54933
	54157	54649	55067	55016	54933
	54151 NEAR R.R.	54647 NEAR R.R.	55067	55021	54933
0+75	55650	54348	54735	54851	55010
	53064	54349	54740	54849	55006
	55916 NEAR R.R.	54352	54737	54852	55009

1+25	1+50	1+75	2+00	2+25	2+50
54990	55000	55018	55196	55124	55124
54994	54999	55009	55193	55123	55115
54993	55001	55010	55195	55121	55115
54923	55004	55013	55013	55057	55073
54926	55006	55014	55012	55059	55073
54926	55009	55015	55011	55057	55071
54969	55073	55004	55054	55097	55105
54987	55076	55006	55048	55095	55100
54906	55072	55007	55051	55094	55102
54959	55035	55024	55053	54979	55043
54956	55081	55025	55056	54976	55043
54961	55084	55025	55054	54977	55043

	2+75	3+00	3+25	3+50	3+75	4+00	
0+00	55118	55154	55204	55190	55060	55196	
	55115	55153	55203	55192	55060	55205	
	55115	55153	55203	55194	55056	55205	
0+25	55042	55033	55058	55015	55025	54999	} near heavy equip.
	55043	55029	55059	55013	55027	54998	
	55041	55034	55056	55014	55027	55002	
0+50	55100	55083	55062	55005	54962	54899	
	55092	55088	55003	55020	54986	54967	
	55090	55084	55019	54991	54989	54957	
0+75	55019	55004	54966	54855			
	55031	55003	54955	54895			
	55029	55002	54943	54919			

NEAR EXCAVATION heavy equipment

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STA	0+00	0+25	0+50	0+75	1+00
OFFSET					
1+00	54155	54734	54798	55025	55043
	54175	54893	54756	55023	55039
	54160	54711	54792	55022	55040
	NORTH R.R.				
1+25	53490	54490	54844	55064	55183
	53484	54491	54835	55054	55179
	56325	54489	54838	55060	55184
	NORTH R.R.				
1+50	54150	54889	54930	55214	55011
	54153	54871	54929	55209	55009
	54162	54873	54930	55200	55009
1+75	54563	54560	54791	54984	55143
	54560	54568	54798	52770	55142
	54565	54568	54799	54002	55142
				*	
2+00	57235	54841	54739	54939	54981
	54825	54841	54735	54936	54979
	54822	54841	54736	54939	54985
2+25	54855	54857	54910	55372	54975
	54853	54858	54911	55370	54980
	54850	54860	54912	55349	54982

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1+25	1+50	1+75	2+00	2+25	2+50
54993	55119	55166	57681	54963	55098
54997	55114	55166	57916	54962	55100
54998	55119	55166	57239	54964	55091
			NORTH MOTEL GARAGE		
54626	55120	55081	54741	54946	55014
54615	55143	55079	54727	54983	55012
54604	55128	55080	54728	54982	55015
NORTH MOTEL					
55128	55001	55014	55044	55089	55097
55126	55000	55024	55042	55089	55094
55131	55001	55024	55044	55088	55100
55528	55298	55093	55345	54943	55008
55520	55294	55090	55347	54947	55007
55524	55301	55089	55331	54944	55008
55067	55083	55108	55119	55101	55110
55065	55034	55106	55119	55105	55089
55066	55028	55100	55120	55105	55088
55021	55151	55141	54830	55037	55042
55020	55149	55144	54825	55034	55042
55022	55140	55145	54831	55034	55039

STA	2+75	3+00	3+25	3+50	3+75
OFFSET					
1+00	55105	55050	54996	54627	
	55099	55020	54639	54707	
	55100	55049	54761	54307	
1+25	55015	54981	54370		
	54997	54984	54818		
	55015	54982	54857		
1+50	55102	54915			54980
	55093	54944			54934
	55087	54944			54934
1+75	55276	54836			55277
	55253	54826			55270
	55252	54823			55270
		AIR cylinder			
2+00	55289				55287
	55287				55290
	55287				55290
2+25	55013			55100	55295
	55011			55111	55290
	55009			55112	55291

4+00
55315
55277
55307
55197
55180
55181
55200
55212
55215
55273
55280
55285
55290
55291
55293

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STA	0+00	0+25	0+50	0+75	1+00
OFFSET					
2+50	54910	55007	55038	55050	55201
	54973	55005	55035	55051	55200
	54972	55005	55030	55049	55198
2+75	54950	54981	54988	55002	55056
	54955	54979	54989	56003	55056
	54953	54985	54989	55002	55056
3+00	55035	55063	55072	55105	55124
	55035	55063	55070	55103	55124
	55034	55068	55072	55105	55127

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1+25	1+50	1+75	2+00	2+25	2+50
55283	55194	55077	55059	55092	
55290	55195	55079	55060	55093	
55288	55197	55080	55065	55095	
54984	56863	57223	55047	55029	
54998	56849	56980	55047	55030	
54995	54951	54950	55050	55051	
		*			
55125	55126	55129	55135	55105	
55130	55124	55134	55136	55107	
55127	55124	55132	55136	55105	

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STA	2+75	3+00	3+25	3+50	3+75
OFFSET					
2+50					55183
					55189
					55190
2+75				55190	55173
				55190	55180
				55188	55188
3+00		55190	55185	55170	55101
		55195	55175	55175	55103
		55193	55180	55174	55105

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4+00
55180
55175
55177
55185
55173
55170
55031
55029
55025